Submission No: 118

CHAMBER OF COMMERCE AND INDUSTRY

WESTERN AUSTRALIA

29 June 2007

The Secretary
Standing Committee on Industry and Resources
House of Representatives
PO Box 6021
Parliament House
Canberra ACT 2600

Dear Sir or Madam,

Please find attached the Chamber of Commerce and Industry of Western Australia's (CCIWA) submission to the House of Representative's Standing Committee on Industry and Resources inquiry into the development of Australia's non-fossil fuel industry: case study into selected renewable energy sectors.

CCI would welcome the opportunity to discuss the content of this submission in more detail should the Committee conduct hearings in Perth.

If you require any further information concerning this submission, please contact CCI's Senior Adviser – Industry Policy, Ms Jessica Shaw on 08 9365 7498 or CCI's Senior Adviser – Environment Policy, Ms Brenna Pavey on 08 9365 7514.

Yours Faithfully,

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Section One: About CCI and our process

1.1 About CCI

CCI is the leading business association in Western Australia. It is the second largest organisation of its kind in Australia, with a membership of approximately 5,000 organisations in all sectors including manufacturing, resources, agriculture, transport, communications, retailing, hospitality, building and construction, community services and finance.

Most members are private-sector businesses, but CCI also has representation in the not-for-profit sector and the government sector. Over 80 percent of members are small businesses, and members are located in all geographical regions of WA. Some 100 business associations are affiliated with CCI, expanding the organisation's representative coverage to more than 10,000 enterprises.

1.2 Our consultation process

CCI welcomes the opportunity to provide this submission to the House of Representatives Industry and Resources Committee.

To ensure that this submission reflects the views of WA industry to the greatest extent possible, the Chamber has conducted an extensive consultation process, involving both member and non-member companies.

Several of CCI's policy forums, including the Climate Change Committee, Resources and Energy Committee and the specially convened Electricity Reference Group which informs the Resources & Energy Committee on electricity matters, have contributed to this submission. CCI also hosted a workshop for CCI members and non-members to gather feedback on the issues covered by the Committee's terms of reference.

CCI met with companies to gain more detailed information on particular technologies or specific aspects of the inquiry and we have also sought member feedback through our various publications.

CCI would welcome the opportunity to discuss the content of this submission in more detail should the Committee conduct hearings in Perth.

Section Two: WA's Electricity Industry

WA's electricity industry has a number of unique features. Our power system is physically fragmented and characterised by a number of interconnected grids of varying sizes and remote stand alone systems. WA also has a separate electricity market, structured differently from the National Electricity Market (NEM).

2.1 The South West Interconnected System

WA's South West Interconnected System (SWIS) is the largest network in Western Australia and covers most of the State's South West region. The SWIS stretches from Geraldton in the north down to Albany in the south, and out to Kalgoorlie in the east. Approximately 55% of the State's electricity is generated on the SWIS.

The SWIS is located approximately 1500 kms from the power system connecting Australia's central and east coasts. The massive distance between the SWIS and the national electricity grid makes interconnection between them highly unlikely.

There are approximately 880,000 connections on the SWIS. During three consecutive hot days in early March 2007, demand from these connections peaked to 3575 MW on 9 March 2007. Overnight loads on the SWIS are much lower and generally sit at around 1100 MW.

The SWIS has an installed capacity of approximately 4100 MW, comprising mainly gas- and coal-fired thermal base load plant. Non-fossil fuel generators, powered by wind, solar, hydro, landfill, and sewerage methane, are also present. The proportion of renewable energy on the SWIS currently sits at approximately 4.2%.

2.2 Regional Western Australia

WA's size and geographically dispersed population makes interconnecting the entire state economically unviable. Regional and remote communities are therefore serviced either by smaller interconnected systems or remote stand-alone systems.

Smaller interconnected systems exist in Cossack, Port Hedland, South Hedland, Karratha, Roebourne, Wedgefield, and Point Samson.

Regional non-interconnected systems exist in Broome, Gascoyne Junction, Menzies, Camballin, Halls Creek, Mount Magnet, Carnarvon, Hopetoun, Norseman, Cue, Kununurra, Nullagine, Denham, Lake Argyle Village, Onslow, Derby, Laverton, Sandstone, Esperance, Leonora, Wiluna, Exmouth, Marble Bar, Wyndham, Fitzroy Crossing, Meekatharra and Yalgoo.

Private companies operating mining, mineral processing and other operations in remote and regional locations often generate their own electricity and may supply electricity to surrounding communities.

Regional and remote areas are powered predominantly by fossil fuel sources. Renewable energy technologies contribute approximately 2% of total electricity generated.

2.3 The Wholesale Electricity Market

Just as WA is physically disconnected from the national electricity grid, we are also separate from the National Electricity Market, operating instead under the Wholesale Electricity Market (WEM), which covers the SWIS.

The WEM is in the early stages of development and follows an extensive period of reform, which culminated in the vertically integrated state-owned utility, Western Power, being disaggregated into four separate trading entities on 1 April 2006:

- Synergy (the state-owned retailer);
- Verve (the state-owned generating company);
- Western Power (responsible for system and network management); and
- Horizon (servicing remote and regional communities).

The WEM, which commenced operations on 21 September 2006, has a number of objectives defined in the Wholesale Market Rules:

- "to promote the economically efficient, safe and reliable production and supply of electricity and electricity-related services in the South West interconnected system;

- to encourage competition among generators and retailers in the South West interconnected system, including by facilitating efficient entry of new competitors;
- to avoid discrimination in that market against particular energy options and technologies, including sustainable energy options and technologies such as those that make use of renewable resources or that reduce overall greenhouse gas emissions;
- to minimise the long-term cost of electricity supplied to customers from the South West interconnected system; and
- to encourage the taking of measures to manage the amount of electricity used and when it is used."[1]

Generators and retailers are the major participants in the WEM. Retailers purchase wholesale amounts of electricity from generators, and then on-sell to customers.

The majority of electricity traded through the WEM is sold through negotiated bilateral contracts. To ensure flexibility around daily demand and supply fluctuations, trading around the bilaterally contracted positions occurs in the separate Short Term Energy Market (STEM). Since commencement, new retailers and generators have entered the market, and trade through both bilateral contracts and on the STEM has increased. The Independent Market Operator (IMO) administers the WEM and is also responsible for WA's primary mechanism to ensure sufficient generation capacity—the Reserve Capacity Mechanism (RCM).

The Reserve Capacity Mechanism is unique to WA. According to the IMO, the RCM is intended to ensure that the SWIS has adequate installed capacity available from generators and demand side management at all times so as to:

- "cover expected system peak demand while providing adequate additional capacity to ensure demand can be met in the event of failure of the largest generator while maintaining some capability to respond to frequency variations; and
- remove the need for high and volatile energy prices that are required in markets like the NEM to provide adequate revenue for peaking facilities and to trigger new investment."[2]

By remunerating companies based on the capacity they make available to the SWIS in a particular year, the RCM contributes substantially to the capital outlay required for base load plant, and often fully covers the cost of constructing peaking facilities.

Section Three: Non-Fossil Fuel Sources in WA

WA's electricity system and market structure differs from those of the NEM. As will be discussed below, this has implications for the various fuel technologies under the Committee's consideration. The chief lessons to be drawn concerning renewable energy sources in Western Australia are two-fold:

[1] WA State Law Publisher, 19 September 2006, "Wholesale Electricity Market Amending Rules", p. 1.
[2] Independent Market Operator, September 2006, "Wholesale Electricity Market Design", p. 28.

Firstly, each source has, or may have, a role to play in WA's energy market. Secondly, WA's energy market structure and infrastructure collectively determine those roles. This is elaborated as we discuss each fuel source.

3.1 Solar

Both photovoltaic (PV) and solar thermal installations occur in Western Australia, on and off the grid, and at the household level, in regional and remote areas, and in limited commercial applications. ABS statistics for 2005 show that 13.5% of WA households have installed solar water heaters.[3]

The main advantage of solar systems is that, by their very nature, they can be readily and reliably scheduled onto the grid. Their disadvantage lies in the difficulty of storing energy for use overnight and the variability or reliability of generation on intermittently cloudy or completely overcast days. Considerable reserve-generating capacity is required to back up systems that rely heavily on PV. Units dispersed across a large grid, however, may be less vulnerable to unreliability on intermittently cloudy days due to sheer geographical spread.

It is also noteworthy that solar PV systems tend to be at their most effective after peak periods – the sun is strongest after the morning peak between 7.30 and 8.30 a.m. and weakens when demand for air-conditioning tends to peaks in the afternoon, from 5.00 p.m. onwards.

State rebate schemes for solar power apply solar hot water heaters where there is a $500 subsidy for natural gas-boosted solar water heaters and $700 for bottled LP gas-boosted solar water heaters used in areas without reticulated gas.[4] According to the State's Sustainable Energy Development Office, "householders replacing an electric hot water system or building a new home may also be eligible for Renewable Energy Certificates of up to $900, as a result of the Federal Government's Mandatory Renewable Energy Target."[5]

Only the federal government offers incentives for the installation of PV systems on houses, schools, community buildings and new residential developments. In WA, SEDO administers this program, which in 2007 increased the subsidy to a maximum of $8000 for domestic installations. A feed-in tariff encourages the installation of domestic on-grid rooftop systems to a degree, but the installation rebate is based solely on the output of PV modules included in a system. Residents must therefore incur the cost of employing an electrician for installation and pay for additional equipment such as frames, batteries, inverters, cables and charge regulators.

A smart meter is also required in order to recover revenue derived from feeding power back into the grid. These hurdles might explain the low uptake rate in the State since rebates were introduced in 2000—only 139 households in WA have installed a grid-connected solar power system.[6]

The WA Government has also committed $1 million to its Solar Schools program, which will fund the installation of photovoltaic systems (minimum 950W) in 100 metropolitan and regional schools by 2009.[7]

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[3] Australian Bureau of Statistics, 2005, "Environmental Issues: People's Views and Practices", p. 43.
[4] WA Sustainable Energy Development Office, 2007. "Solar water heater subsidy", available from http://www1.sedo.energy.wa.gov.au/pages/subsidy.asp.
[5] Ibid.
[6] SEDO, need source
[7] SEDO, http://www1.sedo.energy.wa.gov.au/pages/solar_schools.asp

There are a handful of larger systems on and off the SWIS, including a 20 kW tracking system in Kalbarri and a 20 kW trough concentrator at Murdoch University's Rockingham campus.[8] A 32 kW off-grid system commenced operations at the Mount Morgan work camp, part of the Department of Corrective Services.[9] A 31 kW solar-diesel hybrid system will help power Hamersley Iron's Hamersley Station.[10]

The scope for industrial installations would not improve without a feed-in tariff, as the MRET scheme on its own has not served to encourage business to take up more solar technology. Solar-thermal boosting of industrial processing, for example, is an area where renewables could play a major role in the business setting, but little research is being pursued in Western Australia on this front.

There is greater potential for higher renewable penetration rates in regional and remote areas of the state, where the cost of electricity supply on average is much higher than on the SWIS. Photovoltaic systems are increasingly economically competitive with diesel in some areas, although the isolated nature of remote off-grid systems means each has its own cost of supply. (In the National Electricity Market, solar power is economically competitive during daytime hours.) Typically, remote off-grid systems also do not feature variable pricing, which one remote provider acknowledges would help make renewables more viable in the regions. This company has, however, achieved a 10% renewable installation profile.

The lack of a carbon price has been cited as a disincentive for industry to invest in solar projects across the State, as has regulatory constraints, such as the lack of widespread variable pricing of electricity linked to time-of-day consumption. Investment in integrating technologies and energy efficiency should also be seen as key ingredients of the renewables and low-carbon mix, as they are critical to extracting value from technology.

In the case of on-grid solar applications, for example, reliability and load-shifting technology are important for increased uptake. The viability of off-grid applications will depend significantly on improved storage (batteries) and demand-side management techniques.

3.2 Wind

Worldwide, wind technology is the most advanced of all the renewable energy sources. Size of installations and efficiency of transmission are advantages, whilst predictability and regularity of supply are not.

In Western Australia, the MRET scheme has stimulated the development of 180 MW of wind generation. The State's major retailer, Synergy, has also recently called for an additional 50 MW of renewable capacity, which, given the commercial development of the technology, is likely to be sourced from either wind or biomass.

Wind farms exist in several locations along the WA coastline, from Exmouth, Coral Bay and Denham in the north to Kalbarri, Geraldton, and Emu Downs (powering the state's first desalination plant) on the west coast. There are more farms in Albany, Bremer Bay, Hopetoun, and Esperance on the south coast.

[8] Ibid., http://www1.sedo.energy.wa.gov.au/pages/waproj.asp
[9] Ibid.
[10] Ibid.

The Government has pledged to power WA's second desalination plant with renewable energy (25 MW by 2011); wind is one of the main commercially viable technologies that could fulfill this need.[11]

Wind presents challenges to system reliability on the SWIS, whose baseline source of thermal power (primarily coal) is not conducive to flexible load balancing, needs long lead times to begin generating and therefore runs most efficiently when operated continuously at a consistent level. If the wind ceases to blow, base load plant cannot generally be quickly fired up to compensate. Gas plants are more flexible – they can be more easily turned down or completely turned off if necessary. Because WA's grid is isolated, energy also cannot be drawn from across the state border to meet a shortfall, as is the case in the national grid.

While the use of wind energy is widely supported by industry, the increased penetration must be managed in a way that does not destabilize the network. Wind power tends to be most readily available at night and therefore constitutes a greater proportion of generated electricity during the lowest load period.[12] Overnight, wind generation displaces the energy generated by thermal plant, which can lower thermal plant efficiency, which in turn increases their greenhouse emissions intensity.

Base load plant must continue to run in order to be available the next day when load increases. However, because wind turbines are operating (and under WA's market rules, their energy must be fully fed onto the SWIS when generated), thermal plant's generated energy is not fed onto the grid.[13]

Wind penetration needs to be carefully managed, and the impact and desirability of high levels of intermittent wind generation on small isolated systems must be carefully assessed. The current capacity of the SWIS to accommodate a large increase in wind generation is limited; moreover, wind tends to have low availability during summer peaks.[14]

Conversely, there are examples of wind farms that are more productive during the day.[15] Furthermore, thermal plants can be turned down, gas plants are capable of complete shut-off, and there is no material loss of efficiency at coal thermal plants at turn-down levels above 60%.[16] Locating wind farms at multiple points on the grid can also mitigate the impact of intermittent generation; the geographical spread of the SWIS may therefore be conducive towards installing more wind capacity.

A report recently commissioned by the Office of Energy, *Maximising the Penetration of Intermittent Generation on the SWIS* focusses heavily on wind generation and acknowledges the impact of intermittent generation on network reliability and system management. The report argues, however, "an effective method for reducing the intrinsic variability of the primary energy source for intermittent generators is through geographic diversity in site locations."[17]

To facilitate a greater geographical spread of intermittent generation, the report states that a system-wide infrastructure upgrade would be required. The report acknowledges the challenges wind presents for overnight system management[18] and

[11] WaterCorporation is yet to call for expressions of interest to provide the Second Desalination Plant's energy requirements, but expects proposals from a range of technologies.
[12] Personal communication with Western Power System Management representatives, 7 June 2007, 29 June 2007.
[13] Ibid.
[14] Ibid.
[15] Personal communication with Griffin Energy representative, 29 June 2007.
[16] Ibid.
[17] EConnect , 2005, *Maximising the Penetration of Intermittent Generation*, p. 9.
[18] Ibid, p. 13.

emphasises the need to improve land planning procedures for wind farm sites.[19] The report essentially concludes that the SWIS could take a greater degree of renewable energy penetration, but a considerable amount of further research, infrastructure and technology development would be required.

The report identifies the need to:

- Improve information about the impact and operation of intermittent generation;
- Improve network stability, through both market and physical/structural improvements;
- Improve network frequency stability, through better forecasting, frequency control ancillary services and inertial control;
- Enhance geographical diversity, utilising price signals in particular; and
- Maintain load balancing and reserve capacity, particularly incorporating better pricing signals.[20]

Wind appears to be well suited to WA's off-grid market, where fossil fuels (chiefly low-load diesel generators) provide backup power. Favourably located regional towns of up to 10,000 residents can be 100% powered by wind combined with low-load diesel, with 40% of the daytime load derived from wind. The Esperance system provides a particularly good example of a successfully operating wind-diesel system.

Prospects for wind beyond the scheduled MRET installation period are not strong, with a price of $35 per MWh needed to make projects viable (for a total of around $80-82/MWh). Wind generators are not enthusiastic about the State Government's commitment to an aspirational target, which does not offer them any increased certainty and therefore mitigates no risk.

There is still considerable scope for installing more wind power in WA, provided system reliability issues are mitigated and/or the mix of generation sources are sufficiently robust to support the intermittent nature of wind generation. However, if other technologies better suited to base load power or more flexible peaking generation come online, wind's attractiveness will be further eroded.

3.3 Wave

Wave technology could prove to be a new base load technology in Australia.

WA-based SeaPower Pacific is running pre-commercial stage trials in Fremantle of its CETO wave technology, which promises to combine renewable power generation with a desalination plant. CETO is estimated to be about two years away from commercialisation, and the project has a projected 30-year life cycle.

Federal funding of $700,000 and private investment of around $11m have provided the working capital for the development of CETO. Environmental approvals required for the wave farm, which is submerged at 20-30 metres but within 2 km of the shoreline, will likely be restricted to the State level.

There are about 30 companies worldwide developing various wave technologies, with a small number operating at the pre-commercial stage in Australia. The coastlines of Western Australia and southern Australia provide considerable opportunity for wave farms, owing to good sources of wave power and proximity to markets. In addition to

[19] Ibid., p. 9.
[20] Ibid., pp. 10-13.

the factors limiting financial viability, major hurdles include environmental approvals and competition with recreation activities.

3.4 Geothermal

Geothermal energy also presents opportunities for alternative base load power sources in WA with minimal greenhouse gas emissions. Whilst some 'hot wet' resources exist in the State's South West, 'hot dry rocks' are proving to be of significant interest, and available temperature data from hydrocarbon exploration have indicated a number of potential sites, including Perth Basin, Carnarvon Basin, Canning Basin and Officer Basin.

Geothermal energy is climate independent, giving it a distinct advantage over solar and wind for reliability and volume of deliverable electricity. Geothermal can also be used for heating and cooling, if the energy source is close to the end use. In Perth, the Claremont swimming pool has been heated to a constant 28°C by geothermal energy, enabling it to operate year-round since December 2003.

Plant life in some European installations has been projected to 50 years; some Australian developers are using a 25-year life in their forecasts.

Major challenges for developing geothermal energy in WA include insufficient data on potential sites, cost of drilling, low efficiency ratios (although these are increasing as the technology improves), lack of enabling legislation, and potential for long distances between source and users. However, sites within Perth and Carnarvon Basins may be in reasonable proximity to users.

Data indicate that large areas of the Australian continent feature the geological environments necessary for base load geothermal development. Considerably more investment in information gathering must be made to further develop the industry, however. Most of the available information is derived from existing petroleum well data, which are insufficient to adequately define geothermal resources without additional measurements and assessment. These would be required to assist exploration and eventual development.

In addition to the high cost of drilling, development of geothermal hot-dry and hot-fractured rocks requires water (pumped down at high pressure into the fractured reservoir and back up to the power plant), which in many areas of the country is in short supply. At one of its sites in South Australia, Green Rock Energy plans to use a local mine's wastewater, which normally would have been left to evaporate.

Legislation that gives geothermal developers security of tenure from exploration through to production is needed in WA to facilitate further development. Other states have pursued new or modified legislation with varying degrees of success for the industry. Exploration and testing is particularly active in South Australia.

As with other renewable energy sources, price signals are needed to further encourage development of geothermal applications. A carbon price and/or feed-in tariff would provide more certainty and financial incentives for investment and development. The feed-in tariffs in Europe have spurred growth in France, Germany and Hungary.

3.5 Bioenergy

Bioenergy can come from many sources. In Western Australia, the chief fuel sources are primary, i.e., from crops and agricultural and forestry waste. Secondary (food processing and wood manufacture) and tertiary applications (post-consumer waste) also exist on much smaller scales. The variety of fuel sources corresponds to

considerable variation in calorific value and fuel efficiency, end-use applications, engineering solutions for power generation or product development, and capacity to offset greenhouse gases.

Primary biomass resources in WA include, in decreasing order of existing crop area, cereals (grain and straw), oilseeds, bluegum and pine forestry, oil mallees, and cane (sugar and bagasse).[21] Cereals are readily available but compete with food and have low energy ratios.[22] Forestry wastes are increasing in availability and have better energy ratios; more work is needed on cellulosic technology.[23] The oil mallee tree, native to WA, is well-suited to bioenergy production, due to its hardy rootstock and fast regrowth; it features even better energy ratios than other forestry waste and can contribute to salinity and water management. Sugar cane is in small supply and located far from demand.[24]

In WA, biomass is used to generate electricity and in the production of fuels (ethanol and biodiesel). Across the state there are 11 smaller-scale biomass (landfill and sewage methane) power and co-generation plants operating with a total generating capacity of 25.5 MW.[25]

Woodwaste feeds a 5 MW installation in Muja, and bagasse powers the Ord Sugar Mill (6 MW) in the north of the state. A further 71 MW of generation is proposed for three further biomass plants around the State, along with an additional 194 MW sourced from biogas, municipal waste and animal waste.[26]

The integrated wood (mallee) processing technology, to be used in a 1 MW plant under construction in Narrogin, is attractive because in addition to generating power, it has two other products – eucalyptus oil and activated carbon. Wood pellets from WA are also attracting attention in Europe for application in heating and co-firing due to their high calorific value and low water content.

Location of feedstock, particularly forestry waste, does not correspond directly to network demand in WA. Installation of biomass power plants in forested areas may mean they do not run at optimum efficiency if the power they generate is ultimately drawn to urban centres; on the other hand, if the power can be consumed locally, remote installation can serve to reduce transmission losses. This underscores the need to consider the network as a whole when planning and installing renewable power generation; a state energy policy would do much to aid this process and ultimately yield a more efficient and manageable network.

Ethanol production is in development in Western Australia, with the construction of plants planned to be in production by 2008 yet to begin.[27]

Biodiesel production has increased significantly in Western Australia in the past few years, from 23 million litres in 2002 to over 200 million litres in 2006. Planned production is projected to reach nearly 900 million litres by 2008.[28]

Applications using secondary and tertiary sources are mostly at the boutique level, catering directly to interested end-users, as well as some agricultural waste

[21] Wu, H. and Bartle, J., 2007, "Future Biofuels for Western Australia", Curtin University of Technology, available from http://www.wasea.com.au/downloads/seminars/biofuels2007/Wu.pdf.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Geoscience Australia, 28 February 2007, "Map of operating renewable generators", available from http://www.ga.gov.au/renewable/.
[26] Ibid.
[27] WA Department of Agriculture, 2007, "Western Australia Biofuels Taskforce Report", p. 23.
[28] Ibid., p. 29.

applications for use directly on farms, although there are legislative and fiduciary constraints around farm-scale biodiesel production.[29]

WA's grain industry is well-suited to the development of a biofuels industry, but more research is needed to determine factors such as economic viability and natural resource management applications.[30] Regulatory hurdles are also considerable, with licences and approvals required at all three levels of government.[31]

Climate change has the potential to both negatively affect production of some feedstocks and encourage the development of others, as well as to improve the climate for investment in new feedstocks and fuel development. Algae is an example of a feedstock being researched for its suitability to biodiesel. As with other renewable fuels, a carbon price would assist investment decisions for bioenergy crops and product development.

3.6 Hydrogen

Since hydrogen is typically sourced from fossil fuels, it does not technically qualify as a renewable or non-fossil fuel unless it is produced from biomass.

However, two applications in Western Australia are noteworthy.

The WA Government is participating in a trial of three hydrogen fuel buses in conjunction with BP (the fuel manufacturer), BOC (the fuel purifier), DaimlerChrysler (the bus manufacturer), Path Transit (the bus operator), several federal and state government agencies, and the WA Conservation Council. The demonstration project, runs in parallel with the HyFleet CUTE program in 10 European and three California cities, and is being used to gain experience working with hydrogen as a transport fuel in pre-commercial conditions.

Separately, BP and RioTinto recently announced their formation of a joint venture, Hydrogen Energy, which has selected Perth as one of its three trial sites for the development of a hydrogen- base load power plant that makes use of carbon capture and storage (CCS) technology.

The Kwinana Industrial Area will be the site of the demonstration project, which will generate up to 500 MW of electricity, to be fuelled by coal sourced from nearby Collie. A saline aquifer about 35 km west of Kwinana is the designated destination for the 4 million tonnes of CO2 that will be produced annually from the process.

Valued at $2 billion, the Kwinana project would be the world's first industrial-scale power project integrated with carbon capture to be fuelled by coal and the first power project to store the CO2 in a saline formation. (A parallel Hydrogen Energy demonstration project in California would use petroleum coke as the fuel source.) Hydrogen Energy will take until 2011 to do the research and development necessary to secure an investment decision; in addition to proving the viability of the saline aquifer, significant work must also be done to secure a favourable legislative framework for CCS in both state and federal jurisdictions.

If each stage of the project proceeds successfully, full-scale operations could commence by 2014.

Five hundred MW constitutes just under half of the SWIS overnight load and represents a quarter of current generating capacity, raising questions about the ability of the network to forecast and balance such a significant new contribution.

[29] Ibid., p. 35.
[30] Ibid., p. 23.
[31] Ibid., p. 35-37.

Section Four: Policy Issues

Each of the above technologies to some degree present challenges or are affected by broader policy issues. Some matters of particular concern are listed below.

4.1 Omitted technologies

CCI notes that the Committee did not include hydro electricity under the terms of reference, nor did it invite comment on demand side management (DSM). DSM in particular presents significant opportunities to extract maximum efficiencies from electricity generation. Waste heat recovery from industrial processes is another area deserving R&D and investment attention.

CCI urges the Committee to consider inviting further comment on DSM, hydro electricity, integrating and other technologies as part of its ongoing review of non-fossil fuel sources.

4.2 WA's unique electricity system

As has been described, WA's physical and market structure differs significantly from the national electricity market. The impact of intermittent energy sources on small, isolated systems can be significant. They can present considerable system management challenges but, at the same time, speak to the need to consider nodal installations for delivery of power close to demand.

Decisions about energy policy and generation sources taken at national level can have profound implications for WA. CCI urges federal policy-makers to consider the unique WA situation when considering responses at the national level, especially since the State contributed over a quarter of domestic economic growth in the last year. Solutions must be tailored and contextually appropriate to each jurisdiction in which they may be implemented.

4.3 State energy policy

The WA Government does not have a clear, strategic and focussed energy policy. Statements are made regarding various policy initiatives, but the detail concerning how these programmes and policies interrelate and what part they may play in the State's energy future is rarely articulated.

The State lacks an overarching, strategic plan covering vital issues such as generation mix, the role of fossil and non-fossil fuels (including nuclear), infrastructure development and access to fuel sources. For example, this submission has referred to the flexibility of gas-fired plant in the context of balancing intermittent generation and its potential value as a transition fuel into a carbon-constrained economy. However, restrictions in the supply of gas in Western Australia have prevented investment in the very plant needed for flexible load balancing.

The State Government's domestic gas reservation policy reflects a perception by Government on the availability of gas for the domestic market, but does not take a holistic view of the market. It ignores the physical constraints and difficulties

throughout the entire supply chain.[32] The lack of coordination and articulated strategic vision for WA's energy future has created a climate of uncertainty, making WA a potentially less attractive place to do business.

CCI strongly urges the State Government to develop a comprehensive energy policy that provides the basis for the State's energy security and future development.

4.4 Regulatory burden and approvals processes

WA businesses face excessive red tape, regulatory overlap and duplication. This threatens to stifle the development of all industries, electricity included. Any recommendation regarding regulatory reform must consider how proposed measures will interact with policies and legislative regimes already in place. Coordination and cooperation between all levels of government are vital.

4.5 The need for a carbon price

The technologies discussed in this paper, to some extent, will all require support or financial incentive to develop. All are either marginally economic or uncompetitive with fossil fuel sources at current prices.

CCI has long argued against government 'picking winners' or giving preferential treatment to particular technologies. A decision on a carbon price and a firm position on emissions trading would send signals through the market and stimulate the development of these technologies, as well as mitigate the substantial risks now facing the WA economy's ability to meet its medium- and long-term energy needs.

CCI continues to actively participate in policy development for emissions abatement and adaptation and supports the development in Australia of the institutional mechanisms needed to facilitate an emissions trading system that recognises Australia's, and Western Australia's, unique economic conditions.

These include a streamlined emissions reporting system, verification methods and human resources, along with other market- and non-market-based policy measures that encourage R&D and investment and address adaptation. Certainty surrounding emissions trading and a carbon price would provide more investment certainty and appropriate market signals for the development of fossil and non-fossil fuel technologies alike.

4.6 Market and system structures

Closely linked to carbon price and market signals is the actual structure of the electricity market, system management processes, and the development of the network as a whole.

Market rules should be structured to promote the entry of a diverse range of generators. System management technologies and practices should be developed to enable the efficient management of intermittent generation. Additionally, generation

[32] CCI has recently completed an extensive report examining the West Australian gas industry. The Report entitled *Meeting The Future Gas Needs of Western Australia* is possibly the most comprehensive analysis of the sector yet undertaken. It proposes a series of measures, chiefly to accelerate the development of potential gas fields and known reserves and to boost gas volumes able to be pumped to the state's south. The Report can be made available upon request.

sources should be installed in a more geographically diverse manner throughout the SWIS. This will facilitate a more secure, reliable and efficient network.

Most importantly, it should be recognised that the most efficient and effective system is likely to be one that incorporates a range of technologies, each serving the need to which it is best suited. Whilst non-fossil fuels present promise, they can realistically form but one part of our overall technology mix.

There is no doubt that fossil fuel sources that currently play a vital part in the generation mix are likely to continue to for many decades to come. The focus must be on measures that reduce the emissions-intensity of those fuels whilst at the same time increasing the viability of renewable energy sources.

Furthermore, over-reliance on any one source, or a disproportionate amount of any one technology, is likely to lead to system unreliability and insecurity. CCI recommends the adoption of policies based on the premise of 'security through diversity'.

Section Five: Conclusion

CCI acknowledges the Industry and Resources Standing Committee initiative to conduct an inquiry into an issue that presents such challenges for Australia and is so vital to our national development.

We reiterate that most non-fossil fuel technologies are either economically marginal in the absence of a carbon price and variable electricity pricing or commercially unviable at their current level of development. Each may, however, have a certain niche role to play in the overall energy mix.

The need for ongoing market development and investment in system design must be considered and cannot be satisfied simply by looking at the development of particular technologies or energy sources. The Committee should also consider the development of the ***system*** into which these technologies will be 'plugged' and the ***markets*** through which they will be traded.

CCI argues that any consideration of the national energy mix or of federal energy policy should examine the conditions specific to the Western Australian system and market, even though they differ considerably from those of the NEM. The WA economy is forecast to continue growing over the next several years, and its preponderance of trade-exposed, emissions-intensive industries could provide valuable learning opportunities for the Australian economy as a whole, in the context of scientific and economic implications of shifting to a carbon-constrained world.

CCI believes that our security lies in developing a diverse range of energy sources, each suited to its own niche. Delays in decisions and holistic policies are jeopardising the State's development. Ultimately, industry and the community need leadership from government, both state and federal.