



Environment Business Australia

The energy conundrum - should Australia seek to be an energy superpower or a sustainability superpower? Or can we be both?

Environment Business Australia submission to the Geosequestration Technology Inquiry

Submitted via email: scin.reps@aph.gov.au

Executive summary - the need for a national energy inquiry rather than a geosequestration inquiry

Environment Business Australia (EBA) believes that carbon capture from coal fired electricity plants, followed by its compression, storage and its eventual underground sequestration, is an important area of study in the search for technology approaches to reduce greenhouse gas (GHG) emissions. However, EBA believes that it is vitally important to have an analysis of the life-cycle costs and implications of all current and potential energy sources, including profiles of their greenhouse gas emissions and other pollutants, their supply availability, and their security.

Australia requires a new and far-reaching energy strategy to replace the current approach of studying energy supply sources in 'silos' isolated from competing energy sources and isolated from studies of negative externalities and their economic, public health, quality of life and environmental impacts.

Australia needs an energy strategy that will address energy security, climate change and Australia's competitiveness in domestic and export 'carbon constrained' markets.

There are four main issues which EBA recommends the Geosequestration Technology Inquiry should focus on:

- That while the injection of CO₂ has been proven feasible, it is **not** proven that CO₂ can be stored securely and indefinitely underground. There are significant safety issues at stake.
- The capture, compression, storage and transportation of CO₂ will significantly raise the cost of coal fired electricity to a level where competing energy sources may be more competitive than coal and their share of the market should therefore be increased
- The call from the coal industry to delay the introduction of a carbon price signal until such time as geosequestration and other clean burning coal technologies are proven commercially viable, raises a fundamental issue of competitive neutrality. A **delayed** carbon price signal will negatively affect gas, renewables, and energy efficiency. A carbon price signal is a necessary market catalyst for new technologies which do not have the same critical mass in the market and therefore have not had the opportunity to amortise their R&D costs or to reduce production costs through operational trialing and volume of electricity production.
- That if geosequestration fails at some stage in the future, the ensuing financial liability will require immense offsets as well as replacement sources of energy. Therefore it is prudent to study and develop a portfolio of energy sources alongside clean coal.

EBA's strongest recommendation therefore, is that this inquiry should investigate new ways of using financing and market instruments which can encourage the R&D, commercialisation and deployment of clean coal technologies, including geosequestration technologies, **alongside** energy efficiency and the development of a broad suite of clean energy sources. This would provide a better roadway to

help build Australia's next competitive edge in clean energy generation and 'materials stewardship' systems.

Investors are seeking certainty and without a position on the shadow/contingent cost of carbon, investments into long-term infrastructure are stalling, and risk is being ill-directed.

An over-arching energy inquiry will serve Australia's current and future interests as it will be able to investigate a portfolio approach of combining emerging renewable and low greenhouse gas (GHG) emissions energy sources and efficiency measures with new, cleaner and safer ways of using traditional fossil fuels and nuclear energy.

The Geosequestration Technology Inquiry should also identify what Australia will do if oil prices continue to rise, or if climate stresses force more rapid GHG emissions reduction requirements. Therefore this inquiry should look at energy sources and their uses by power plants; transmission efficiencies; demand side energy efficiencies (including conservation of embodied energy in materials by recycling - i.e. "materials stewardship"); and transportation fuels and systems and geosequestration's place in this 'mix'.

Key recommendations included in this submission:

- Federal Government should set up a national energy inquiry
- A carbon price signal should be introduced
- Competitive neutrality - ACCC/CoAG investigation into market access
- Measure externalities and include in pricing in order to seize new opportunities
- Use government's powerful tools and levers more effectively
- Federal Government should appoint a national Energy and Climate Change Minister

Issues to be addressed

Carbon price signal and competitive neutrality

EBA most strongly recommends that a carbon price signal be developed to ensure there is competitive neutrality. The investments of 'cleantech' generation leaders must not be undermined by traditional fossil fuel energy generation being slow to embrace GHG emissions reduction and energy efficiencies. It is uncompetitive and irrational to block incentives/catalysts/market-mechanisms that could improve overall energy performance simply to provide time for one particular technology to prove its effectiveness - because it could fail in the attempt. Regrettably, current energy policy appears over-weighted in favour of carbon capture and storage from stationary energy plants.

That a carbon price signal is firmly on the table can no longer be doubted - the Federal Government's inquiries into carbon geosequestration and nuclear fuel will not be able to provide any recommendations of merit in a price vacuum - both require full price cost recovery for viability. Investments into the Low Emissions Technology Demonstration Fund (LETDF) by business and government require a carbon price signal if they are to fully commercialise and deploy the technologies demonstrated. Geosequestration technologies, similar to nuclear energy, cannot be price competitive unless a carbon price signal is educating the market about the need for, and the benefits of, new technologies. EBA therefore believes that a carbon price signal is inevitable and we recommend most strongly that Australia's national interest will be best served with an early introduction rather than a delay.

It is not suggested that carbon trading or a carbon tax are long-term or complete solutions - their importance lies in catalysing technology improvements that can bring on line new sources of energy, increase efficiencies, and recycle embodied energy, which, over time, will render these market instruments neutral.

AP6 members, and some elements of the Australian coal industry, are now calling for a carbon price signal to support the technology approach to abating and mitigating greenhouse gas emissions.

Measure externalities - both sides of the balance sheet are important

EBA strongly recommends that this proposed energy inquiry evaluate current and foreseeable externalities associated with energy choices and the direct and indirect costs they inflict on the national economy.

Opportunities to be grasped

Transition to an energy strategy capable of better addressing climate change will put Australia in a stronger position to be able to take advantage of new investment and technology opportunities. While Australia may offer relatively small scope and scale for major institutional investors, there are areas in clean technology, renewable energy, energy efficiency, materials stewardship, forestry and carbon offsets which Australian pension funds and overseas investors are actively seeking. Evidence that Australia is dealing with the shadow, or contingent, cost of carbon will be an important signal to these investors.

Australia has tremendous potential to use carbon offsets and this is an area of valuation of particular importance to Australian farmers, who, having delivered Australia's Kyoto target consider themselves unrewarded.

Time for a national Energy and Climate Change Minister

EBA also calls for the appointment of a national Energy and Climate Change Minister. This recommendation should not be seen as criticism of the minister who has responsibility for climate change as part of the environment portfolio or the minister who has energy as part of the industry portfolio; it is time for the many issues facing energy security and climate change to have the full-time focus of a minister who can champion outcomes across multiple agencies and departments. AP6 has already shown that the industry department needs to be involved in climate change and EBA argues that treasury, finance, health, security, defence, trade, agriculture, transportation, education, science, infrastructure, and water departments/agencies are key areas that also need to be far more actively involved in seeking solutions and capitalising on opportunities.

Government intervention

Government intervention is not about picking winning technologies - it is about avoiding picking losers. The importance of government intervention via long-term policies is required because the marketplace is not an effective intermediary when it does not have full and timely intelligence on all the ramifications of the different energy sources - it opts for the 'perceived' lowest initial cost, ignoring the longer-term operational costs and collateral damage. The importance of this market failure should not be underestimated - foreseeable environmental consequences from climate change has the potential to lead to economic failure, agricultural failure, infrastructure breakdown and mass migration, and to the extent that Australians feel falsely immune to these effects, due to our geographical isolation, trade and other barriers will have their effect.

Weave in/weave out framework

A review of competitive neutrality should be an integral component of an over-arching national energy inquiry to ensure that new technologies and approaches are not disadvantaged. A framework to weave in new technologies and weave out those that have reached their 'use by date' will be required. However, the framework should also provide clear stepping stones for traditional energy and industry sectors to be assisted in responding to new marketplace demands for goods and services which are produced with low greenhouse gas (GHG) emissions.

Realistically we have a limited amount of time to achieve this before other countries take the lion's share of the new market. Or, we reach a tipping point of climate change impacts that are irreversibly damaging. EBA strongly advocates the need for new tools that can deliver timely and meaningful pricing signals as well as regulation designed to fast-track innovation.

Bridge to the future

A first-class energy strategy is essentially a *bridge to the future*. It will be critical that all skills, technology options and available financing be focused on achieving the outcome that is needed to

provide sufficient, reliable, clean, safe and affordable energy. This is the realistic priority - if it is not achieved no number of band-aid solutions or short-term policies will be worth a grain of salt, no matter how worthy they may be. Certainly our new bridge cannot afford to be split in the middle by the game of brinkmanship between supporters of the Kyoto Protocol and the creators of AP6.

This bridge approach needs bi-partisan support from Federal, State and Territory Governments and leading political parties to address the inseparable issues of energy supply and combating climate change.

Nuclear, coal or renewables?

The energy debate is fraught with emotion as it lurches between whether Australia should do more with nuclear energy or whether the emphasis should be on geosequestration of carbon dioxide from coal-fired power plants. EBA believes that both probably have a 20 to 25 year transitional role in the broader energy portfolio, but we stress the importance of including the many other serious contenders in the portfolio - including efficiency gains, embodied energy conservation (basic materials stewardship), gas-fired technologies, cleaner coal-burning approaches, deep geo-thermal, and the broad suite of renewables. Each has a role to play at one or more stages on the bridge. The merits, costs, risks, and timelines of each need to be evaluated in the context of a national energy strategy.

The nuclear energy issue in relation to geosequestration

Both Australia and Canada have stated their intent to export fuel grade uranium, and it is highly unlikely that nuclear energy will not be a major source of energy for the next 20 years. EBA's premise is that if the world is to have nuclear fuelled energy, then every step from extraction, refining, design/operation/final decommissioning of power plants, and final waste treatment and storage of the radioactive waste, must be done in the safest possible way, to avoid the risks of proliferation and radiation damage. Nuclear fuel leasing may help achieve this, especially as it provides the option for nuclear "waste" to be recycled many times.

It has been suggested that Australia has a moral responsibility to monitor and take back the waste from its exports of uranium and this may be so. But the more fundamental issue is the leadership role that Australia can play in making sure that nuclear fuel does not lead to proliferation of nuclear weapons. Nuclear fuel leasing and storage of spent fuel rods in Australia would appear to offer the world's most secure storage option due to the combination of Synroc technology, our geologically stable and dry storage sites, our geographic isolation, and our political stability and membership of the Western Alliance.

Commercial nuclear fuel leasing has the secondary benefit of implying a carbon price signal into the marketplace, because it fully prices the proper management of the wastes generated from a practically zero GHG emission energy source (at point of electricity production). **Although radioactive waste needs to be stored for many thousands of years, the risk involved is considered less than today's continuing accumulation of carbon in the atmosphere where it remains for over 80 years.** Growing concerns about climate change highlight the need for early and aggressive abatement of greenhouse gas emissions in order to halt the forcing of natural climate variations into unprecedented extremes.

Coal produces radioactive waste

Coal does not only emit carbon dioxide. It contains uranium and thorium and while high percentages of these radioactive elements are contained in the flyash rather than emitted to the atmosphere, this flyash is sent to landfill, used in chemical fertilisers, or used in cement manufacture which does nothing to remove its radioactivity. Therefore Australia is already storing significant quantities of radioactive waste (albeit in far from optimal ways) and some of it is likely to make its way to our immediate dwellings and offices¹.

¹ Ref. <http://www.uic.com.au/nip59.htm>

Most coal contains uranium and thorium, as well as potassium-40, lead-210, and radium-226. The total levels are generally about the same as in other rocks of the earth's crust. Most emerge from a power station in the light flyash, which is fused

Coal industry accepts need for GHG reductions and clean coal technologies and a carbon price signal

Notwithstanding the comments above where EBA is critical of the elements of the coal industry who are stalling a carbon price signal, there are other elements of the coal industry who have basically accepted the inevitability of a carbon price signal by stating the intent to introduce clean coal-burning technology and to capture and geosequester carbon dioxide from power plants. This is because it is reasonable to expect that the price per kilowatt hour of coal-fired electricity will increase to the end-user. The additional cost of approximately \$40 to \$60 (and this is a conservative figure, as oil industry experience suggests \$100) a tonne of carbon abated, will be attached to fuel combustion at the power plant, rather than absorbed by society bearing the impact and costs of environmental damage.

It is, however, of the greatest concern to EBA that there have been proposals, including from the Queensland Premier, that carbon pricing should not be introduced until clean coal technologies are proven. This has several implications:

- Firstly, it will delay a carbon price signal (specifically carbon emissions trading), and this, as emphasised above, will be detrimental to the development/commercialisation/deployment of renewable energy, other clean energy sources, and energy efficiency programs (including conservation of embodied energy by recycling materials, i.e. materials stewardship).
- Secondly, it is in contradiction with the AP6 process where it has already been identified that technology solutions require investment and that investors require certainty and longevity in the marketplace.
- Thirdly, this stalling of a carbon price signal by governments attempting to pick a 'winner technology', has the effect of conferring on clean coal a monopoly-like status. It raises the question whether this is considered necessary because clean coal will only be 'viable' if it has the lion's share of the international marketplace, which would include keeping China and India on an energy diet consisting of coal? This is an issue the Geosequestration Technology Inquiry should investigate.

Notwithstanding that most experts agree that coal has a significant and important role to play for at least 20 years, this is anti-competitive behaviour and policy that reduces the competitive growth of other energy sources and efficiency measures and, as such EBA call for urgent investigation by the ACCC and CoAG.

Renewables will become cost-competitive

When the price of coal-fuelled energy includes its full production costs it will become comparative, in cost terms, with nuclear energy. At that point, the competitive advantage of renewable energy sources (which are clean, reliable and abundant, but which presently have low market share) will then become clearer. Scaling up the market share of any product or service, with the attendant innovation, usually reduces its unit cost, and so it is likely to be with renewable energy.

Therefore, EBA emphasises, in the strongest possible way, that Australia and other countries should be planning for renewable energy to be the future feedstock of choice in the longer-term because we know it is abundant, reliable and clean.

Obviously, and pragmatically however, our *energy bridge* needs to close the gap between today's capacity to harness renewable energy and this clean energy vision for tomorrow.

and chemically stable. Some 99% of flyash is typically retained in a modern power station (90% is some older ones), and this is buried in an ash dam.

The amounts of radionuclides involved are noteworthy. In Victoria, 65 million tonnes of brown coal is burned annually for electricity production. This contains about 1.6 ppm uranium and 3.0-3.5 ppm thorium, hence about 100 tonnes of uranium and 200 tonnes of thorium is buried in landfill each year in the Latrobe Valley. Australia exports 88 Mt/yr of steaming coal averaging 1.1 ppm U and 3.5 ppm Th in it (Dale & Lavrencic 1993), hence 100 tonnes of uranium and 300 tonnes of thorium could conceivably be added to published export figures; maybe double this if the 87 Mt/yr of exported coking coal is similar.

Short-term pricing is not a basis for a strategy

The bridge also needs to close the current pricing gap, and it will be critical to overcome the short-term frenzy on prices. Australia, more perhaps than other countries, is caught in a 'Catch 22' situation - direct costs of petrol or electricity to the end-user are hi-jacking long-term strategic planning. And compounding the problem, the development, commercialisation and deployment of clean energy is constrained because of the *perception* of higher costs into the future. The costs of collateral damage (negative externalities) are not currently included in energy pricing and they are increasing. What the industry end-user or the consumer does not pay for is left to the taxpayer to handle. This malignant cycle is creating an exponential growth curve of cost for future generations.

Therefore, as part of a long-term strategy, early and clear price signals are imperative for researchers, investors, boards of directors and analysts to be able to act in a way that is beneficial to their interests and also to the interests of the community.

Inquiry to develop the nation's next generation energy plan

An energy plan that serves Australia now and into the future should therefore be a national priority. To deliver far-reaching and long-term strategies requires a full scale inquiry to study the:

- Design of a framework that would enable new technologies to be developed, commercialised and deployed, in a market currently dominated by fossil fuels
- Potential for fuel-switching to new energy sources, or up-grading the efficiency and the abatement of GHGs of current sources
- Various sources of energy, longevity of supply stocks, greenhouse gas emissions profile, domestic and international security; current scale and potential rate of development (while there are immense stocks of coal available to be mined this does not guarantee that clean coal technologies will emerge as cost-competitive. Nor does it guarantee that geosequestration technologies will work. While it is "hoped" that geosequestration will work this is an emotional aspiration rather than a factual premise capable of offering sufficient security for investors or markets)
- Potential early gains that can be achieved by maximising efficiency on both demand and supply sides
- Benefits of early action to reduce current and future costs associated with negative externalities and to eliminate or re-allocate perverse subsidies. The potential gains from unexploited positive externalities also need investigation
- Incentives which will catalyse early action and produce the 'technology fix' in time for it to produce results
- Changing profile of international markets and investment patterns, and the introduction of a carbon price signal
- Changing profile of trade and environment and Australia's next wave of competitiveness
- New industry opportunities in abatement and mitigation of GHGs especially in light of International Energy Agency (IEA) statements that world energy demand will increase 70% by 2030 largely because of the growth of Chinese and Indian economies

Use Government's powerful tools and levers more effectively

New policy measures and strategies are needed. If the keystone of the bridge is clean and efficient energy, there must also be a masterplan that incorporates a new way of using the tools and levers that control the broader economy. This is in order to overcome issues of stranded assets or the long-lead time involved in rethinking industrial processes and in updating/replacing current infrastructure. Industry may have innovation in technology but government's role is to make sure that taxation, regulation, market based instruments, procurement and investment support new opportunities and do not entrench old impediments.

Making funds available today to secure benefits tomorrow is part of the 'enabling framework' behind a strong portfolio of choices and assets. This will help build the energy bridge's 'slip roads' - where

new technologies can be fed in and where technologies and energy sources that have been surpassed can be transitioned out, with compensation and relocation support if required.

R&D&D&D

Research and development needs to be backed up with full scale demonstration, this has been recognised by government with the support given to LETDF, but the final "D" - deployment is important for all new beneficial technologies and this is an important consideration for the overarching energy inquiry proposed by EBA.

Energy costs

The choice of energy source, its extraction/capture; power plants that produce less emissions; energy storage technologies; transmission lines that are more efficient; and demand side management efficiencies all need a carbon price signal because increasingly global markets will demand that the negative externalities of energy need to be incorporated into a market price that reflects the cost of curbing GHG emissions. Arguments that this will increase the cost of electricity to the end-user can, at least initially, be easily countered by measuring the money saved by efficiencies - several major corporations, including BP, have demonstrated this.

Potential increases in the cost of electricity should not stall action. Efficiency measures to reduce the amount of energy used by industry, commerce and households are in their infancy and have great potential to reduce the amount of energy required. This is not just about audits and retrofits but includes fundamental technological change in the way we extract/produce/recycle the materials we use for energy and manufacturing. It is conceivable that there could be no net increase in electricity bills if efficiency is addressed on both supply and demand sides. If there were to be a marginal increase in the cost of energy, a social welfare net could be developed to make sure that disadvantaged households do not have to curtail electricity use for basic needs. That is a strategic policy design decision and should not be held out as a reason for inaction.

More important than energy prices is the balancing act between the cost of energy, the productive capacity of Australia, materials stewardship, environmental integrity, public health and quality of life. It is time for business and government to recognise that climate change is a bigger threat to the Australian economy than energy prices.

Another way of approaching the climate change issue is to treat it as the next opportunity to drive economic efficiencies, just as work-place health and safety, quality systems, workforce training, and just-in-time logistics have been used over the past 30 years. While the window of opportunity is closing - climate change does not need to be a cost burden on society, it can be the opportunity of this generation to justify investment in the next wave of efficiency systems and technologies that will 'leap-frog' Australia into a trade surplus. Greenhouse gas reduction is really a synonym for energy efficiency – and with oil prices tripling over the last year or so this seems like common sense.

The marketplace is evolving around us

The marketplace is gradually building a new playing field - at present it may appear to be lumpy, stretchy, and wobbly but it is likely to serve Australia's longer-term interests better than the current market. Change is occurring because investors and consumers are beginning to demand the avoidance of risk and this will only increase with international pressure from groups such as the Carbon Disclosure Project (with US\$31 trillion of funds under management) needing to be informed about companies' activities that could lead to a carbon liability exposure. Australia's choice is now whether to lead, be a fast follower, or lose competitive advantage.

It is certain that the ranking of energy sources will change. This poses risk and liability for the unwary - but unprecedented opportunity for those who are prepared.

Areas of security concern

In relation to energy supply, communities and markets share two understandable areas of concern - fears of a nuclear holocaust; and fears of a break in the supply of oil before countries have reached a

point of energy self-sufficiency. The third concern is that runaway climate change could trigger major food and water shortages and mass migration².

Conclusion

Today's global energy supply mix will evolve into a new energy portfolio. Natural resource limitations, full life-cycle cost recovery pricing, security issues and climate change demand change.

A carbon-constrained world is an act of choice and to realise this choice the oil, coal, nuclear and renewable energy sources must be priced according to their real cost - including their cost and benefits to the environment, public health, security, quality of life and national and regional economies.

Avoiding the foreseeable disaster of climate change should be our top priority and responsibility - there is no cost higher, no greater imaginable complexity or tragedy, and there will be no come-back if we get it wrong.

"It is time to rise again to secure our future." What greater legacy could there be?

“This is our chance to create a safer, cleaner, more efficient economy, with more jobs!”

Background

EBA's role is to raise awareness about the scale and relevance of environmental challenges and, on behalf of its members, to put forward the solutions capable of reducing what are clearly foreseeable threats to the economy, the environment, security, and quality of life.

As the independent, non-partisan, not for profit organisation representing Australia's emerging environment and sustainability industry EBA is the voice for proactive industry. Our organisation is helping to shape early and aggressive action to help reduce climate change impacts. This is not an approach based purely on altruism, it makes commercial sense to create and seize new market opportunities.

Fiona Wain
Chief Executive Officer
Environment Business Australia
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EBA is based at 2A Mugga Way, Red Hill, ACT
Tel: 02 6270 1333
web: www.environmentbusiness.com.au; email: eba@environmentbusiness.com.au

² See Alan Dupont and Graeme Pearman's Lowy Institute paper 'Heating up the planet'