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Sustainable energy is the solution to global warming, builds nations and prevents inflation.

Opinion by Dr Ray Wills, Chief Executive Officer, WA Sustainable Energy Association

The future of energy in Australia and for the globe is an array of sustainable energy solutions that lead to sustainable outcomes for the community and the nation.

A succession of reports from the Intergovernmental Panel on Climate Change (IPCC), and in Australia from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Bureau of Meteorology (BOM), describe increased certainty of dangerous climate change and underscore the need for an increased urgency for action on global warming created by human activity.

Climate change induced by global warming will change the distribution and abundance of a huge range of species, and impact on agriculture, forestry, tourism and a raft of other economic activities that contribute to the welfare of Australian communities.

The IPCC has increased the stakes by indicating a new level of emissions cuts of 85% from 1990 emissions levels is now required to combat dangerous climate change. The number - the level of reduction scientists believe is necessary to have a 50 per cent chance of avoiding a dangerous rise in global temperatures - rises as we delay, and the latest IPCC climate report essentially says any further delays on action are no longer affordable.

The IPCC has been in operation for more than twenty years this year (2008). The warnings from the IPCC and the science community get more urgent each year not because of hysteria or conspiracy, but because every year for the last two decades we have failed to act on the warnings and the problem only continues to get worse.

This has come about because governments all around the world have failed to act - if we are not decisive and act now to put solutions in place within the next few years, dangerous climate change will become almost impossible to avoid, and most certainly inconvenient.

Combined with the scenarios released in November 2007 by CSIRO and BOM in their report *Climate change in Australia: technical report 2007*, and subsequent reports prepared in support of the Garnaut Climate Change Review, the potential for further abrupt changes in Australia is alarming.

We do not have decades to respond to this – we have already had decades. It is time to take the heat out of this problem.

We should have acted on global warming in the last century when the first science based warnings were forthcoming. We are now out of time and significant climate change can no longer be avoided. We must act decisively now if the most dangerous of climate change is to be averted.

The single largest concern of climate change driven by global warming will be the sudden changes that occur. We have already seen one very clear abrupt climate change event in Western Australia – the loss of rainfall in WA in the mid 1970s, and with potentially a second step at the end of the last decade. Climatic changes are already leading to the elimination of the northern wheatbelt as a wheat growing area, the demise of the best grape growing regions in the south-west is likely to follow. And abrupt climate change will cause havoc not just in our agricultural systems.

Global warming will ultimately result in climate changes in Western Australia that will, on the basis of the CSIRO report, cause the extinction of many of our most recognizable species such as *Banksia* and *Acacia*. The drought reported in the Kalbarri National Park in 2007 was the same event that severely impacted on our farmers in the northern wheatbelt.

But still we are not acting with urgency.

And the biggest danger from the ongoing work on the science of climate change is not 'pessimism' but the reverse - science is inherently conservative. It is likely future forecasts of climate impacts will be greater, not smaller, just as has occurred in the last six years. Interim targets set conservatively now are almost a guarantee of doing too little, of creating measures that are simply too small.

If the Rudd Government response to the study into emissions trading by Professor Garnaut only delivers a minimalist target and narrow application of the scheme for Australia, we can expect with certainty the need for an even higher target to quickly follow, and we will be busy implementing initiatives that will simply not solve the problem. And that will not be good for a market-based solution – it will create turbulence in the market and will certainty end up costing us more.

I once believed there was room to argue that Australia has special circumstances. The reality is we in Australia must do as much as we possibly can, and not simply adopt only those measures that are not overly inconvenient for our purse. Half measures, chosen as those that do not inconvenience our lives, will not address this problem.

The challenge of climate change should be the catalyst for changing the way we think about and plan infrastructure, changing the way we use energy and in so doing, future proofing our economy. All of our infrastructure built in the last century is at risk, built to the specifications of one in 100 year storm events, which in this century will prove to be one in 25 or one in 15 or year events, and similarly 25 year events will be one in 5 year events – or less. And within this century, sea levels rise will reshape our coastline.

A key element of managing this change is an integrated, whole-of-government approach to tackle the enormous challenge that global warming poses to Australia and the world.

One of the key impacts of our misuse of energy and emissions – through the impact on climate change - is on water. And ironically, the provision of both water and energy requires a similar kind of approach in sourcing, distribution, and supply. And energy, like water, has always been undervalued in Australia. Other links between energy and water are sometimes missed, and one is that water is heavy and requires energy to move it around, and so saving water saves energy. This can translate to another irony, producing water in a desalination plant within a couple of hundred kilometres of its point of use is a far more energy efficient approach and will use less energy than pumping water large distances down pipelines. The message about a paradigm shift in water management seems to be getting through, but not yet on energy.

All nations are looking for energy security and this is clearly relevant in Australia.

Inaction will condemn markets that rely on resource-extraction for energy with increasing demand bound to drive up the price of fuel sources and inflation. Oil prices will continue to spiral beyond $140 per barrel with on-going growth in demand from China and India, and no doubt pushing up inflation in Australia. But measures designed to reduce greenhouse gas emissions will help to reduce our reliance on fossil fuels - renewable energy will continue to shine on us, to wash up on our shores, and to blow past us without additional cost, as well as grow abundantly on our land.

Australia is the Middle East of renewable energy and we are failing to harvest the energy bonanza for the benefit of the Australian economy and especially for Australia's export industries.

Governments must put frameworks in place that take an integrated approach to develop significant, forward-thinking initiatives on sustainable energy. A sustainable way to fight inflation is deliver energy efficiency in all things - including our homes and for our vehicles - that result in long term energy savings and reduce inflationary pressures from rising energy prices that would otherwise impact on the CPI.

And in the early start up phase over the next few years, all Australian governments should aim to put government operations, including community service provision, in the most efficient buildings, either through upgrading existing accommodation or moving to new buildings, and then use renewable energy. For example, this should include all water supplies - not just desalination plants, but groundwater extraction, and water and wastewater treatment as well. Governments should also announce immediate improvements to fleet procurement standards to ensure they are buying and using only the most efficient vehicles And all government procurement programs must be costed to include not just carbon neutrality, but to be carbon negative – taking a bigger share of cutting Australia's greenhouse gas emissions.

Our governments must commit to ensure new buildings built on the public purse are energy efficient and powered by renewable energy. For example, recent funding commitments in Western Australia to health and the arts failed to consider how this same expenditure could also

reduce greenhouse gas emissions in those sectors. If we are to solve global warming, we need joined up thinking that considers the implications of our use of energy in everything we do. To do this, iconic new community facilities such as the Fiona Stanley Hospital and the new Perth Stadium must become leading examples of eco-efficient design, and so epitomise the best in efficiency in energy and water use, with a further commitment to power those facilities with renewable energy. Similarly, while improvements in public transport infrastructure have the potential to contribute to reductions in greenhouse gas emissions, the new infrastructure and the growth of our urban sprawl around the train network will increase emissions – unless we ensure new projects are carbon neutral.

Opportunities exist to use sustainable energy projects as a way of restructuring and refurbishing towns and cities, and contributing to the renewal of flagging rural economies, creating sustainable communities.

Over the past decade, Australia missed many opportunities to improve national energy efficiency standards in our transport fleet. The Federal Government should be focussing on things it can control and not measures that simply help us watch the price of oil continue to rise in a global market. Stronger measures on National Average Fuel Consumption numbers that determine the standards for vehicle fuel efficiency of new passenger and transport/commercial vehicles are critical.

The only way to guarantee price savings on fuel is to consider the total fuel bill, not the price per litre. And the only way to do something about that is by raising the standards for vehicle fuel efficiency of the Australian fleet. Such measures will reduce running costs of Australian vehicles on imported fuels and reduce inflationary pressures on transported goods, on the household budget, and so ultimately on mortgage affordability.

As Australia responds to global warming, a key to managing Australia’s greenhouse gas emissions is getting practical solutions to reduce our energy consumption through energy efficiency, as well as looking for sustainable sources of home grown fuels. Moves to improve efficiency will also address Australia’s reliance on foreign imported fuels to grow energy independence: fuel and oil imports racked up a bill for Australia's deficit of $25 billion in 2007. Rapidly improving Federal mandated energy efficiency targets for the Australian vehicle fleet will reduce costs to all consumers and reduce inflationary pressure on transported goods.

Combined with support for the biofuels industry in Australia, such measures will bolster energy security for Australia, and work to counter inflation. A more sustainable approach to managing Australia’s economy will also reduce inflationary pressures and will reduce the likelihood of future interest rate rises from the Reserve Bank.

To do this, Governments must create budgets that promote energy efficiency across government, business and the community by directing tax relief to buyers investing in energy efficient homes, buildings, appliances and vehicles. In directing such initiatives to both consumers and businesses, an enduring tax cut would be delivered via savings in energy costs, as well as an economy with lower inflationary pressures, and of course reducing greenhouse gas emissions.

The housing industry has continuously blocked efforts to mandate higher energy efficiency standards over the last decade on arguments that this will make houses unaffordable. Those efforts have created inefficient housing with the obvious consequence of locking the Aussie battler into a cycle of debt through building standards that produce homes that guzzle energy, have higher energy bills, and result in less money left over for mortgage and rent payments.

As with fuel, the only way to guarantee price savings on electricity is to consider the total energy bill, not the price per unit. And the only way to do something about that is by raising the standards for building efficiency. The best thing any government can do today is to ensure that building standards and the first home owner grant supports the construction of energy efficient homes with reduced running costs. Sales and rental advertising should be required to disclose energy efficiency on both new and existing homes to allow the potential home owner or tenant to compare the running costs in different houses. In the longer term, an energy efficient home will be a financial winner for tenants and home owners. Governments delivering energy efficiency will be providing long term savings that will become increasingly valuable as energy prices rise and so far more effective than tax rebates.

Governments should look to move all public transport to renewable energy as soon as possible – either in the form of electricity from renewable sources for rail, or biofuels from sustainable sources for as much of the road fleet as we can.

Clearly this is relevant to the things Western Australia must consider in developing a long term strategy for energy in a carbon-constrained market.

In reducing carbon emissions into the next decade, and in the absence of commercial carbon capture and storage (CCS) technology, the only possibility remaining for coal in energy generation into the future is closing old inefficient coal-fired power stations in a short time frame, and replacing those with more efficient supercritical coal-fired plants. However, with the threat of global warming, it is certainly no longer appropriate to build old fashioned coal fired power stations with low thermal efficiency. Inefficient coal will soon be penalised in an emissions trading system and this will create an environment for replacement of those units by power stations with much greater thermal efficiency.

In particular, considerable pressures will be placed on future approvals to ensure emissions are reduced, and it is widely acknowledged that high efficiency combined cycle gas-fired cogeneration power stations will be the key technology for energy generation to transition to lower emissions technology. CCS is one possible option, but it is my view it will be very difficult for future coal-fired power stations to gain approvals as new operations until CCS is achieved.

Australia has extraordinary energy resources - great reserves of fossil fuels and other energy resources. But fossil fuels will increasingly come under pressure not only because of growing demand, but also because of the growing pressure of internalising the costs of carbon – at least until technologies like CCS are commercially proven.

The Achilles heel of gas as a low emissions solution is in fact one of supply and world markets. The bottleneck of gas supplies from the North West Shelf creating an energy generation crisis for Perth and the south-west first in January 2008, and re-emerging in June 2008, highlights the need for more urgent action to create diversified generation capacity for south-west Western Australia. Natural gas has a key role in the transition to a low carbon economy. But restrictions in the gas market could compromise Western Australia's ability to meet greenhouse gas reduction targets. Stepping up with additional renewable energy projects now will reduce this risk in the future. And higher gas prices mean that renewable energy projects will now be more economically competitive and more affordable.

In the case of nuclear, community concerns will stop construction of nuclear power plants at this point. But even if the community change their mind somewhere in the future, even with a carbon signal, nuclear is likely to be too expensive and so not price competitive. This is especially so in WA given our market could only utilise small nuclear plants (under 400 MW) to fit the size of the Western Australian grid. Nuclear also has a long lead time in construction, and the inclusion of nuclear, given the vagaries of construction time of this kind of plant would also make planning for the timing for inclusion in the WA market difficult.

There are many other sound practical and economic arguments that disfavour the adoption of nuclear in WA. One other is a stand-out at this time with the drought in eastern Australia - thermal plants that need water to run steam turbines will be disadvantaged. With current thermal technology, including the current nuclear technology which relies on massive amounts of water for steam generation, this may well prove on its own to be the show stopper in WA.

Developing renewable energy will be important from a number of fronts. While we must continue to look for technology-driven carbon negative strategies into the future, we must also start deploying already available renewable energies that can happen now. The Stern Report, now reinforced by the latest IPCC reports and a variety of new regional reports, clearly describes the economics of why we need to take measures now, and not wait for solutions that may - or may not - come in the next decade or two.

Mandated targets to both deploy renewable energy while simultaneously seeking greatly improved efficiency are critical immediate steps. To this end, governments must legislate to provide a clear investment signal and market certainty, and not just go down a path of wishful thinking.

Western Australia has a wealth of sustainable energy resources and a remarkable array of opportunities for all forms of renewable energy including biofuels, biomass, and biogas and extensive, high quality resources in geothermal, solar, tidal, wave, and wind.

With our sunburnt country and land of sweeping plains, we have to be good at biomass conversion – sustainable biomass that does not compete with food production - or nature - biomass that is also restoring WA regional communities – sustainability hubs that are restoring ecosystems, providing energy to their own communities as well as the State, and may potentially develop solutions for the third world and especially Africa.

In biomass, apart from bioethanol, biodiesel and electricity generation, additional opportunities exist in high-value wood products such as densified briquettes and wood pellets, charcoal, activated carbon and eucalyptus oil. Wood pellets are particularly attractive as they are in strong demand in Europe as a heating fuel and for co-firing with coal.

Oil mallees are one source of reliable, renewable and sustainable biomass available and well suited to growing in Australia. The inclusion of mallees as a part of a sustainable, integrated cropping system maximizes farm yield and optimises environmental benefits on landscapes degrading through salinity and soil erosion. Mallees have a number of benefits including reducing water tables and creating wind breaks.

The integrated cropping system has been perfected over 15 years with significant investment by farmers and assistance from the State and Australian Governments. Mallee crops as part of a farm forestry program can provide a cost effective carbon sink to sequester carbon and yield carbon credits.

If the scale up of renewable energies like wind, biofuels and solar farms - using both solar thermal and photovoltaic technology - occurs in concert with a price signal established by a carbon emissions trading scheme, I have no doubt these will quickly become price competitive with coal and gas operations. Other renewable energy sources such as wave and geothermal hold significant promise as dispatchable baseload and I expect they will also be strong contributors to the growth of renewable energy generation in the medium term.

An important aspect of adopting renewable energy now is it will act as insurance for the community in case attempts at the so-called clean coal solutions such as a commercial scale carbon capture and storage (CCS) solution do not succeed. CCS is technically possible but yet to be made commercial, and so the best hedge against delays in developing the technology commercially is to have more than one option, more than one outcome for the community. And, in addition, adding renewable generation to the mix, even in the event that clean coal eventually arrives, provides a diversity of fuel and energy sources which can only be beneficial, bolstering a diversity of business opportunities as well as energy security in Western Australia.

Furthermore, renewable energy generation is generally more labour intensive, and more broadly distributed across regions. With a better employment factor, renewable energy projects can lead to growth of local communities in rural WA. And establishment of renewable energy generation projects will bolster a broad range of skills, particularly in agricultural regions. Biomass sources – either biomass for electricity generation or feed stocks for bioethanol and biodiesel production - in particular will draw on and build the skills already available in the regions.

An Australian Bureau of Agricultural and Resource Economics (ABARE) report suggesting a massive decline in farm production and agricultural export earnings in coming decades unless we can halt climate change or adapt to it underscores the need to strengthen rural communities to help with the battle against climate change.

Responding to climate change will create new business, new employment opportunities, and a more sustainable economy in Australia. Many of these opportunities will of necessity be spread across the regions in rural Australia, and will not just be growing for the biofuels market -there will also be building, supplying and maintaining regionally distributed renewable energy generation plant, and for land required to be dedicated to wind farms and solar farms. Further, responding to climate change will diversify our industry base. It will create new businesses that are taking up the challenge to take advantage of new opportunities, and the result will be a more sustainable economy.

In addition, Kyoto will open up investment in biosequestration by European investors looking to buy carbon rights in plantations in regulated and verified carbon offset schemes using trees or revegetation projects. These investments are likely to be in the billions of dollars. Signing Kyoto will focus the development of an emissions trading system – agricultural emissions are not yet mooted for the Australian emissions trading system, and are more likely managed through a regulatory approach. Opportunities for rural WA will be many and various – from producing carbon credits for the carbon trading environment to supplying resources to the biofuels market.

Another opportunity is in maximising soil storage of carbon, particularly through the implementation of slow pyrolysis and the use biochar/agrichar in soils. Bolstering soil stored carbon improves soil productivity as well as providing carbon biosequestration potential.

These opportunities will be driven by both emissions reduction targets and by renewable energy targets in Australia, and through demand from international markets once we are formally part of Kyoto. Investors turned up in SW WA before late last century as Kyoto started, but then turned away when we failed to sign Kyoto earlier in this decade. It is not often an opportunity presents itself twice.

The key is ensuring a diversity of energy supply for electricity production. Over-reliance on a single source of supply is not wise. If we had moved faster in the past five years to commission a variety of new renewable energy projects across Western Australia, the current gas shortage would undoubtedly be of less concern.

In focussing on renewable energy, I expect all sectors to flourish, but I predict solar will be the stand out in the next two or three years – primarily because the promise of the technology has been with us for so long – as both solar thermal (using sunlight to generate steam for turbines) and solar photovoltaic or solar PV (direct generation of electricity from sunlight). Solar thermal is attractive to traditional generators as creating electricity from steam generation is what coal based-plants are based on.

Ausra, a Californian company formed with an Australian who could not get his idea funded in Australia, made a significant announcement in December 2007 that will deliver commercial solar thermal to the market, an announcement that has been followed by new proposals by other companies in California and now in Western Australia.

Many regard China as part of the problem, but my view is China will make itself part of the solution. China has a raft of actions rolling out to improve energy efficiency, increase renewable energy generation and reduce greenhouse gas emissions. For example, China has drafted a plan to reduce the energy consumption in per unit gross domestic product by about 20 percent by 2010 from the 2005 level. I also expect that in less than three years, perhaps even by 2009, solar PV production in China will hit such levels that the price per installed watt reduces in the next few years in the same way that the price of LCD TVs have fallen in the last past two years.

As both Australia and the world adopt carbon emissions trading schemes as part of the inevitable response to attempting to slow global warming, the price of carbon will impact on energy production. And a carbon price will make a range of different renewable energy projects immediately commercially viable.

It is time to make a serious commitment to develop renewable energy resources, to establish real targets for sustainable energy – that is both energy efficiency and renewable energy - and set strong, market-based financial signals to stimulate commercial investment.

This will require multiple measures across all available technologies and using all available energy efficiency measures. Market competition is important in the long term, but in the short term new technologies will need support to make it to the commercial phase – the urgency of dealing with climate change is that these cannot be left to natural market processes to grow to that point, but that significant measures must be in place to ensure that the potential of new technologies is reached as fast as possible.

Acting on global warming also requires a reduction in greenhouse gas emissions. We are ignoring the obvious: to reduce emissions, we have to actually - here it is - reduce emissions.

Governments must regulate and ensure any growth in generation capacity comes only from a combination of renewable sources and efficiency gains through cogeneration technologies, while simultaneously insisting on the retirement of the most inefficient, highest emissions power stations in the State within two years, with these to be replaced with lower emissions plant with much higher thermal-efficiency.

Groups with commercial interests in carbon handouts and naysayers alike have said fixing climate change would be devastating for Australia's economy – but their numbers do not add up.

Consider first the daily trade in shares on the ASX, which can be in the range of $10-15 billion in value with almost two thirds of the value usually in around 20 stocks. Losses and gains on the ASX can change the value of the market by $40 billion in a day. The value of one day of trading on the Australian share market is more in dollar terms than would be traded in an entire year in a carbon trading market.

Compare this to Australia's GDP of more than $800 billion per annum, or simply the operations of the Federal Government with an annual budget of over $200 billion. Within normal operations, the Federal Government is now rolling out $31 billion in tax cuts over several years.

The carbon market in the first few years of operation will probably only have a total annual value of $3-4 billion, certainly less than $12-15 billion, and unlikely to ever be worth more than $30 billion annually - unless we are ineffectual in rolling out energy efficiency across the nation, and fail to commit to quickly build renewable energy generation.

With Australia's greenhouse gas emissions at under 600 million tonnes, even if all of this were traded and valued at a large $40 a tonne those total emissions are worth less than $24 billion dollars per year. Compared to daily trades on the share market, this is small change – on rough numbers not even $100 million per day. And as emissions reduce, the number is more likely to fall.

And in addition to emissions trading, investment to reach a 20% renewable energy target by 2020 will require funds in the range of $25 to 35 billion over the next decade. At an average of $3 billion a year, that's not a big number either – and will make a world of difference.

Meanwhile, the Emirate of Abu Dhabi, a state of the United Arab Emirates with a population and a Gross Domestic Product less than that of Western Australia, announced in January 2008, a $18 billion investment program to develop innovative technologies for renewable, alternative and sustainable energy, and that Masdar City is to be the "first carbon-free city" in the world.

This is not to belittle the importance of the task of addressing climate change and designing the best possible emissions trading scheme to assist in the task of reducing greenhouse gas emissions – it will be challenging. And it must fundamentally change the way we think about energy and how we do business.

But it is also achievable, and won't break the economy.

In fact, unlike recent experiences on the share market, the investments we are talking about won't be losses, they will be investments returning real profits in new operations that deliver new jobs in real, emissions free energy.

Investments help build a more sustainable economy for Australia, and that won't cost the Earth - just save it.

The time has run out for solutions that are simply convenient - we need to do that which is required.

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