

Resources into Solutions

Garnault Review submission by Greg Butler 2008

Part 1. Introduction

The irony of the situation is that good people and legal business all over the world continue to consume natural resources and induce gross environmental imbalance through *normal, everyday activities*.

Awareness of the problem is rising however it is an enormous challenge to harness an economy fuelled by ever-increasing demand and install the capabilities to sacrifice consumption, to catalyse acceptable alternatives or to otherwise remunerate eco-systems for degradation.

Ecosystems provide essential services to all people of the world and whether our economic model is robust enough to equitably include environmental threats is the first real challenge of climate change. It is not easy to create parity between our current economic model and our ecology because the consequences of environmental degradation have not yet been fully realised and the inherent lag-times associated with ecosystem demise create margins of uncertainty in the market and lingering scepticism in the mindset.

Nevertheless, everyone agrees that climate risk management requires attention however basic human needs such as food and shelter are daily priorities for everyone on a budget, and seemingly when things get tight, mother-nature ends up at the end of the queue.

Indeed, billions of people are climbing the precarious lifestyle ladder out of poverty and who should deny another human being that opportunity despite the risks?

During the process of delivering this lifestyle revolution for many millions of people our economy has become addicted to environmental degradation and seemingly there is an embedded culture of escalating consumption from one generation to the next.

These complex issues create ethical concerns as readily as they do environmental, industrial and economic challenges.

I feel uneasy and entirely sceptical about slogans such as, "if regulation does not control emissions then the market will".

This assumption seems to overestimate the free markets ability to fully compensate when lag-time and uncertainties are inherent factors in the equation. The estimates for the future price of carbon are much greater than today's low carbon cost and I don't believe that an opportunistic carbon market can ever entirely close that gap. I believe that the daily carbon price will perpetually run at a fraction of the future price and this will inevitably lead to carbon leakage into an environment creeping ever closer to earth's elastic limit.

Furthermore, mankind's ever-present greed and envy are likely to have a significant roll to play in a free market solution. Indeed, speculation of astronomical revenues for government and 'winfall profits' for 'dirty emitters' in the European ETS reeks of resources diverted away for actual solutions for mitigating carbon.

Another key challenge for our free market model is to accommodate real solutions for mitigating climate change that won't make money for businesses and therefore these solutions run the risk of being sidelined without legislative support.

A classic example is passive solar house design. Passive solar design is proven technology, is exceptionally simple, is low or no cost and has been in the public domain for centuries. However, passive solar has a deplorable implementation rate despite all of the irrefutable benefits.

How many more climate solutions will end up on the commercial scrap heap in a free carbon market?

Our current economic and carbon trading models do not cope well with measurement difficulties and again we run the risk of under-utilising our best opportunities because of our fascination with rigid protocols. Nature inherently stores carbon in many places that are exceptionally difficult to measure and often these natural storehouses flux individual carbon atoms while still maintain a net carbon pool. Soil Organic Carbon (SOC) is the largest terrestrial carbon sink on earth and is one of our most prominent short to mid-term solutions in climate management however SOC is a prime example of complex quantification and high flux.

None the less, just like language, economics is a man-made instrument developed to serve society and I believe we need to quickly reach an inflection point where we employ the economy as the catalyst for ameliorating ecosystems.

Due to the essential need to employ the economy as our cultural interface with the surrounding ecology we must be ready to stave off undesirable consequences derived from potentially legal and ill-legal sources.

- We need very strong carbon labelling legislation for emissions reductions and sequestration. The modern corporate marketing machine will excel at disguising marginal or even detrimental processes as favourable commodities for eco-consumers and we have seen some examples of these activities already.
- We need an economic mitigation system that rewards real solutions and not one that masks poor practices or lines trader's and bureaucrat's pockets.

How we achieve a strategic advantage in the new carbon economy and then sell the benefits to our neighbours and trading partners is a challenge for our collective expertise however I will attempt in this submission to provide my perceptions of carbon.

Part 2: Catalysing the Carbon Economy.

To successfully tackle climate change we need to create parity between under-valued ecosystem services and the high costs that will surely follow blatant environmental degradation.

The lag time between benefit and consequences has a significant bearing on human behaviour and humans are very good at 'living for the moment', or at least seizing the opportunity if someone else doesn't. It is difficult if not impossible for a free market to entirely overcome these genetic characteristics.

In order to compensate for these fundamental challenges we require an attractive investment market for carbon solutions reinforced by guaranteed demand capable of delivering genuine solutions.

This summary seeks to encompass some basic principles:

1. The people that will suffer the most from a changing climate are the very same people that can least afford abatement.
2. Investors need incentives to stimulate the carbon economy and the inherent lag-time and uncertainties associated with environmental degradation may not deliver enough impetuous in the free market despite the best intentions.
3. Humans have evolutionary assets and the challenge of climate brings forth a time to wield these faculties to our collective advantage.
4. Humans must believe that we can create industries and lifestyles that are harmonious with nature.

Our derived 'economic system' is a key evolutionary asset and it can be argued that military spending is the engine of the global economy. Military spending would not generally be associated with restoring ecosystem services however the proposal is as follows:

Legislation for consideration

Mandate three (3) concurrent actions:

- A. Implement a 'Carbon Goods & Services Offset' (CGSO) in 2012.
Goods and services must verify offsets for 12% of their carbon emissions in year 1 and increasing by 1% per year for the next 88 years. (Thus 100% offset in 2100).
- B. Introduce immediate 100% mandatory offsets for all military emissions.
- C. Offsets for the military should be derived from sources that directly or indirectly benefit natural resource management.

The proposed outcomes from this legislation are:

A. Implement a 'Carbon Goods & Services Offset' (CGSO) in 2012. Goods and services must verify offsets for 12% of their carbon emissions in year 2012 and increasing by 1% per year for the next 88 years.

The key challenge is to mitigate emissions without pushing high costs through to businesses that would be forced to shed jobs or to pass price hikes onto those that can least afford them. By offsetting all military emissions we can very quickly instigate a strong carbon economy that is borne by the whole tax base and at the same time this enables us to achieve national emissions targets without hitting private business too hard in the initial stages.

I believe simply measuring net emissions from all businesses and subsequently demanding that a percentage of the emissions are offset best achieves this transition. Over time the percentage of emissions to be offset should increase so that by 2100 all business is carbon neutral.

Every business has emissions and each business need to be responsible for their emissions. We don't want to give 'dirty industries' an unfair competitive advantage when we are attempting to create a new age of clean development and we need to steer business towards environmentally responsible practices.

For Example:

Assuming goods and services must verify offsets for 12% of their carbon emissions in year 2012 and increasing the CGSO by 1% per year for the next 88 years. Thus industry would be 50% offset in 2050 and 100% offset by 2100.

This drive towards long-term carbon neutrality has a double benefit, first it further stimulates the demand for verified offset solutions and second it drives emissions reductions technology because business paying a set percentage on a lower absolute amount will gain a cost saving.

For Example:

Let's say that in 2012 'Energy company A' (A) have 100 carbon emissions per year and similarly, 'Energy Company B' (B) have 100 carbon emissions per year. Both A & B have to find verified offsets for 12 units of carbon emissions in year 2012 (100 units @ 12%).

After 18 years, let's say A has adopted technology and has lowered their emissions from 100 units to 60 units per year whereas B has made no change and is still lingering around 100 units per year.

After 18 years the CGSO would be 30% (12% plus 18 more years of 1% increases).

30% of 60 units means that A needs to find 18 verified offsets.

30% of 100 units means that B needs to find 30 verified offsets.

Subject to the cost of emissions reduction technology, energy company A is starting to generate a competitive advantage over B.

If after another 20 years business A drives its emission down to only 20 units in 2050 whereas business B still remains stagnant at 100 units of emissions.

With a CGSO of 50% in 2050.

50% of 20 units means that A needs to find only 10 verified offsets.

50% of 100 units means that B needs to find 50 verified offsets.

Assuming that business A is carbon neutral by 2100 and business B is still emitting 100 units then business A has developed a significant competitive advantage because A does not need any verified off-sets whereas B is having to offset all of their emissions.

Gradually over the next century we can transform our industry, economy and lifestyle.

Today there seems to be favouritism towards reductions being generated from an industry benchmark (for example: Cap and trade based on a benchmark of 1990 or 2004 emissions).

Benchmarking in my view introduces a new set of un-necessary costs and complexities.

Why do we need an industry benchmark from where to calibrate emissions and how is it easily and equitably determined over time?

How is a benchmark determined for complex industries such as agriculture?

It is essential to verify net emissions in any carbon management scenario however it is not necessary to determine industry benchmarks.

The resources required to establish unnecessary benchmarks are resources that could otherwise go into generating actual solutions. It is therefore more effective to administer a net emissions CGSO than a benchmarked trading system and the CGSO drives more fairly at emissions reductions through innovative carbon solutions. Further the CGSO mitigates many of the complexities of the current trading models and if we are serious about tackling the core problem of ecological degradation then let's use the resources that would otherwise go into traders pockets and employ them directly into real technical and operational solutions.

No trading system or carbon tax is going to be perfect however the biggest stumbling block for what is effectively a carbon tax when compared to a cap and trade seems to be the amount of money that traders can make from facilitating cap and trade and not the actual means of generating favourable carbon outcomes.

According to the Point Carbon report commissioned by the WWF, the carbon trading mechanisms in the European ETS are creating windfall profits for coal while any number of other forecasts predict massive revenues for governments and carbon brokers. Cap and trade is turning into a farcical gold rush and a carbon tax or mandatory emissions off-sets such as those proposed in this paper are likely to come under attack because of many vested interests. It is a great challenge for the policy makers to do what is really effective compared to what is easiest and most profitable.

B. Introduce immediate 100% mandatory verified offsets for all military emissions.

In the battle of which countries should be bound to what emissions targets by a post Kyoto declaration, a simple reference point is the extent of greenhouse emission produced from a nation's military activity.

The citizens of developed countries can and should expect their militaries to serve the best interests of their nation and the wider global community. If we now believe the bleak forecasts for climate change then being responsible for carbon is an important act of social and industrial leadership that the military can undertake.

Importantly, the military has been leading innovation since the dawn of time and the militaries sheer scale and systematic approach makes them an excellent candidate to catalyse the carbon economy. Additionally, if the world's militaries were to demand green energy and carbon responsibility from their network of industrial contractors then these supply chain partners may be able to apply their own engineering skills and financial resources to bring forth other advantages.

Furthermore, nations with large military spending often have very high personal or industrial emissions and therefore these nations have the most to gain by creating and widely adopting new technologies and practices. The opportunity to pass these advantages through to the developing world is also substantial for those with the capacity to commercialise expertise. *There are already some limited examples emerging of defence contractors promoting a competitive advantage via carbon-neutrality.* <http://defencedirections-carbonneutral.com>

Another major advantage of utilising military services for greenhouse abatement is that the military are an indirect service provider to the average citizen in most developed countries. That is to say, the majority of the population do not rely on critical military services on a daily basis.

Administering mandatory carbon offsets onto the military will therefore impact the community less when compared to implementing the same conditions onto commercial primary service providers such as the energy sector or agriculturalists.

The private sector may be unable to cope with deep emissions reductions of a magnitude capable of catalysing a new carbon economy without spilling high costs onto the consumers that can least afford it. Nevertheless progress on emissions reduction is required for all industries however the military can buffer industries migration towards carbon neutrality.

The costs for operating a nation's military are borne across the total tax base and therefore

they do not disproportionately affect the lowest income earners as readily as price hikes on the basic necessities of life. This makes the military the ideal vehicle to cut deeply into national emissions reductions without decimating the wider community.

In terms of the global military budget, the cost of carbon neutrality may be relatively small however this same absolute figure is likely to be substantial in the current carbon market.

A speculative example: a \$70,000 missile with carbon offsets required for manufacture and detonation may require \$3,500 worth of carbon offsets (5% of total cost). Based on global military expenditure in excess of 1,000 Billion and a carbon market around 25 billion, then a 5% military allocation to carbon neutrality represents an instantaneous doubling of the carbon economy. I'm proposing that an injection of that amount is enough to catalyse investments into innovative carbon solutions and turn industry around rather than simply providing band-aids over poor practices.

The military has much to gain by undertaking carbon neutrality. Militaries can engage in something that is well supported by the general public and this creates an opportunity to lift the image of the military and thus generate greater respect and improved pathways for recruitment. In terms of recruitment, the military is a significant employer around the world however military budgets directed towards carbon neutrality can create more jobs that are attractive to a wider cross section of the community. These jobs may have a reduced 'defensive' component however the opportunity to impart military training and discipline onto a wide cross section of the community also provides a large pool of ready-made reservists that can become operational in times of public need.

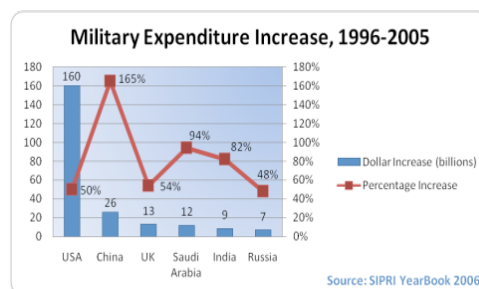
The military also have access to 'restricted areas' and these lands that might serve a dual purpose if they were better utilised for carbon abatement.

If the military and its contractors are going to be burdened with catalysing the carbon economy then additional funding from national taxation revenue may need to cover some of the costs incurred. No doubt that governments around the world will need to commit resources to mitigate climate change and the reality is that the military presents a very viable alternative to manage a percentage of these allocations. Operating in this way further enhances the militaries overall value as a service provider to modern society.

In terms of auditing military operations, each country has a military of some description and even developing countries have significant military budgets. The military has an unshakeable synergy with mankind and military spending is universal despite the fact that it is disproportionate. In fact, many military budgets in developing countries are growing at or above other economic indicators. Those countries with disproportionate military activities may incur a greenhouse penalty however that may not be a bad thing in all circumstances.

C. Verified offsets for the military should be derived from sources that directly or indirectly benefit natural resource management.

The emissions reduction and carbon sequestration potential of emerging agricultural technologies are prominent examples where offset demands from the military can provide the critical stimulus for getting these carbon friendly technologies off the ground. Further, because some of the agricultural based carbon pools are very difficult to measure they are more complex for the commercial market to engage and it may be that these technologies have some fit in a 'best intention military offset scheme'.



Part 3 Carbon Permeance & Labelling Support

Due to the influence of modern marketing it is important that there are strict conditions on what is defined as emissions, emissions reductions, sequestration and carbon confinement. Products should be applied with stringent carbon labelling so that consumers can rate the impact of their carbon consumption.

Carbon is a plentiful substance and for the purpose of applying chemistry to the real world I'd like to propose that we think about the various forms of carbon in three broad families: 'inert carbon', 'confined carbon' and 'organic carbon'.

Carbon Family	Example	Permeance
Inert Carbon	Diamond & Graphite	Infinite
Confined Carbon	Limestone, Marble & Biochar + a few more.	Long 1,000's to millions of years.
Organic or Labile Carbon	Carbon dioxide, Methane, Alcohol, Wood & Bacteria + zillions more.	Short Less than a second to a few hundreds of years

'**Inert carbon**' is a family of carbon substances that persist for an eternity and a well-known example is diamond. Diamond is formed within the earth, where massive pressures and scalding temperature purify the carbon into an impenetrable lattice. Once forged in the form of diamond, the homogenous carbon is virtually indestructible and is generally accepted as nature's toughest substance. The value of diamond to mankind is exhibited through its beauty and extreme durability as an industrial tool however in terms of climate change, inert carbon has little relevance because we do not possess the technology to create inert carbon in a cost or energy efficient manner.

'**Confined carbon**' is altogether a different family of carbon however these substance are also relatively enduring. Some examples of confined carbon include rocks such as dolomite, marble, chalk and limestone. In technical terms, limestone is referred to as Calcium carbonate (CaCO_3) and we see that it is a heterogeneous substance including calcium, carbon and oxygen. The carbon is chemically bound within the rock as a mineral salt and reactions with acids are required to free the carbon. Limestone endures for periods of time that verge on the edge of human comprehension, like 600 million years and for much of that time the limestone has been protected by being buried deep under other geological strata. Today there are thousands of limestone outcrops exposed to the elements and the limestone is slowly undergoing degradation as chemical reactions driven by pH rupture the bonds that have secured the carbon for so very long. Once the carbon is free from the confines of the limestone it marries into the third carbon family, referred to as 'organic carbon' or 'labile carbon'. Fossil fuels infused into source rocks or aquifers within the earth are also physically confined and without intervention the carbon confined within these substances is protected for many millions of years. Fossil fuels however are not nearly as well protected from chemical degradation as rocks and once they are exposed to the natural environment they are usually quite reactive. The natural processes that liberate carbon from confined sources are accelerated through a vast array of industrial processors such as fossil fuel combustion, cement production or the addition of lime to agricultural soils. Ultimately, turning confined carbon into organic carbon is the pre-cursor to ecological imbalance. One real challenge is to find methods that securely confine the liberated carbon because most current sequestration methods have suspect permeance.

'**Organic carbon**' is a widely populated family and includes an infinite array of solids, liquids and gases, including the much maligned carbon dioxide molecule (CO_2). The soils, oceans and every living thing are saturated with organic carbon. The free and reactive organic carbon rapidly circulates through *life* and a single carbon atom may be a nomadic constituent within many distinct substances or creatures. The processing of organic carbon through activities such as burning of calories in living organisms or the oxidation caused by fire invariably results in a single carbon atom being combined with a couple of oxygen atoms in the form of carbon dioxide (CO_2). Recycling organic carbon for energy is the greatest hope for reducing the flood of demands that liberates carbon from otherwise confined sources.

In the forth-coming discussion I will refer to the terms 'confined carbon', 'organic carbon' and 'sequestration' with the following intent.

Confined Carbon:

Carbon with high permeance through either chemical or physical means.

Organic Carbon:

Carbon that is likely to react down a pathway towards carbon dioxide because of physical, chemical or economic influences.

Sequestration:

An event where carbon dioxide is removed from the atmosphere and stored in substances that have limited permeance due to their natural tendency to cycle back towards carbon dioxide (ie. When a tree plantation burns in a bush fire).

It's obvious that carbon is very versatile and the forms in which carbon exhibits itself can be remarkably different. In nature, carbon dioxide concentrations drive organic life through efficiencies in plant and algae respiration however humans are currently liberating carbon at a rate that nature is simply unable to keep up with in its current mode.

What we do know is that plants and algae remove carbon dioxide from the atmosphere and using energy from the sun they produce biomass; another form of organic carbon. Therefore sequestering atmospheric carbon and increasing biomass can be thought of as a sponge or buffer for carbon dioxide however biomass should not be thought of as a safe haven for carbon storage; after all it is still organic and is always ready to head down the highly reactive path back towards carbon dioxide. Unfortunately, most verified carbon offsets available today are based on storing organic carbon within biomass.

Considerations for accumulating carbon in the organic state are:

- Humans are losing terrestrial space for dedicated biomass production due to any number of reasons including erosion, salinity, climate variability and over-population. There are many good reasons for planting tracks of diverse biomass however it should be recognised as a finite solution.
- Biomass production has competing interests for essential agricultural commodities such as food, fodder and fibre. Consumption of these commodities ends up sending the sequestered CO₂ back to the atmosphere. It is therefore impossible to eliminate all carbon dioxide emissions from even the most basic society however consumers may be offset their emissions through other means.
- Some biomass can be turned into fuels such as ethanol and bio-diesel; thus the economic credentials of carbon storage within biomass are challenged by its own energy value. Mainstream bio-energy technology is based on re-cycling organic carbon that is enriched with energy from the sun. Bio-energy is a key ingredient for satisfying energy demand in a carbon smart future however bio-energy needs to be well managed due to a number of ethical issues, particularly the price of food in poor countries. The process is a worthy emissions reduction strategy however in many cases it is less than 100% efficient and usually no carbon is confined through this process (with the current exception of biochar pyrolysis).
- Dedicated biomass production can produce other ecological risks such as those associated with ill-conceived monoculture plantations. Various ecological considerations must be ratified before industries manufacture carbon credits at the expense of the greater good.
- Like other forms of organic carbon, the permanence of sequestered carbon in trees is an emerging issue. Tree plantations are subject to bush fire and the extreme weather induced by climate change further diminishes the carbon security of plantations. Insurance policies and other risk management strategies can mitigate the business risk of plantations however they do not fundamentally alter nature's preferred long-term carbon storage mechanisms. Perennials that store large amounts of carbon in their roots are less risky however these sequestration methods are more difficult to measure and are therefore likely to be less

financially rewarding.

- Soils are the largest terrestrial carbon sink on earth and the storage mechanism is through a build up of microscopic biomass. A dead and lifeless soil is just dirt. However, with careful agricultural management bacteria, fungi and bugs will populate the plant roots under a blanket of straw. Subsequently the organic carbon pool will thrive until the soil smells alive with literally tons of carbon per hectare. Unfortunately, the sequestered carbon in soils is embroiled in debates about the magnitude of carbon pools and how to trade pools of soil carbon. There is however no doubt which agricultural practices favour soil organic carbon and that increasing soil organic carbon is good for climate change. Furthermore, these very same practices assisting in the adaptation of agriculture to climate change. Soil carbon is so important to the global climate solution, particularly in the short term that some trading compromise needs to be reached as a priority. Either operation soil organic carbon through a 'best intent military offset scheme' or auctioning on the open market are two potential mechanism to get the cash flowing to assist with the widespread implementation and improvement of these agricultural practices.

We see that storing carbon in biomass has as many complications and the obvious challenge is to find ways to sequester and subsequently confine carbon that circumvent these issues.

The key to the following decision support tree are the carbon source, the carbons application and the carbon's future.

Example 1: Fossil Fuel = Emission

Easy to measure and high risk

Confined Carbon (oil) \implies extracted / fuel \implies Organic Carbon (CO₂)

We know that burning fossil fuels liberates confined carbon and this is the worst case scenario in terms of carbon management and climate change.

Example 2: Bio-energy = Emission reduction

Easy to measure and moderate risk

Competition to food supplies?

Organic Carbon (CO₂) \implies biomass / process (<100% efficient) / fuel \implies Organic Carbon (CO₂)

Bio-energy is a worthy emissions reduction strategy however if the process is less than 100% efficient some confined carbon will be released. No net organic carbon is removed from the atmosphere or confined in this process.

Example 3: Tree Plantation = Sequestration

Easy to measure and moderate risk

Finite solution, other environmental & social considerations

Organic Carbon (CO₂) \implies biomass (*fire risk) \implies Sequestered Organic Carbon
 \implies Organic Carbon (CO₂)

Trees are currently a major source of carbon offsets however they are subject to significant permeance risk by events such as bushfires and inherently plantations are a finite solution due to limited terrestrial space.

Now let's look at some less conventional examples:

Example 4: Conservation Agriculture (No-Till, straw retention, nitrogen risk management, CTF etc) = Emissions Reduction + Sequestration

Hard to measure but low risk

Other benefits – erosion, climate adaptation, sustainable farming

Organic Carbon (CO₂) \implies increased Soil Organic Carbon (*tillage risk) \implies Sequestered Organic Carbon
 \implies reduced fuel consumption \implies Emissions Reduction (CO₂ & NO₂)

Modern agricultural practices offer an opportunity to adapt to climate change, to achieve emissions reductions and to potentially sequester organic carbon in low risk environments (soils). The problems with modern farming systems is the

If products are going to be labelled for a discerning carbon consumer then products will need to go through some process similar to this.

Part 4: Specific items for consideration

Soil Organic Carbon

Soil Organic Carbon (SOC) is far too important to spend the next fifty years bickering over. We know that SOC is good for adaptation of agriculture to climate change and we know that soils are the largest terrestrial store of organic carbon on earth. It is a solution that that needs incentives, even if it is to the point that it cannot be accounted for to the Nth degree. Once again, it may be that a best intention military offset scheme may have a good fit in an auctioning process.

It is important to note that leading land managers have already been implementing favourable practices for many years and they have carried the substantial risks of innovation. These innovative land managers have served the nation through soil conservation yet under a benchmarked change system they are penalised because they have already began filling their carbon pool and therefore will never be able to reap the same volume of change as a poor operator who has been flogging the land for decades.

How does this sit with the Australian way of a 'fair go' and rewarding those that are ready to make personal sacrifices for the greater good? The answer is it does neither.

Selective Growth

Being more selective in how we grow our economy is a way of reducing carbon emissions.

It is important to consider that economies should serve societies; societies are not there to serve economic indicators although sometimes I do wonder.

Policies that dilute natural resource allocations on a per capita basis and at the same time increase overall human degradation of the ecology are concerning. Policies that favour increasing population are particularly good examples of economic growth overriding environmental sensibility.

This proposal does not in any way attempt to make any judgements on an individual's right to as many children as they please. However the proposal does challenge the notion of governments pushing for higher populations in order to satisfy traditional economic indicators.

Over population is an ecological burden however population growth is a key contributor to many economies and in this submission I recognise how dependant some economies are on ever-greater consumption and how fragile they become if growth is carelessly moderated.

Nevertheless, we need to create alternative polices because ever-increasing consumption is an environmental and social disaster.

The arguments that technology will reduce human impact on the environment may well be true however these ecological footprint reductions are equally applicable to sensible population numbers as they are to high-risk populations.

It is very debateable whether increasing population is in fact good for society now that we have reached a critical mass on this planet. We see from record wheat prices and massive rice shortages how close to the wind our population has been sailing with respect to supply of basic commodities. With finite resources almost all creatures will experience a period of exponential growth before the population plateaus and then quickly declines as resources are exhausted. Humans should have the nous to learn from these natural observations and realise that we too are subject to finite conditions on this planet and that ever-increasing population will invariably bring widespread suffering.

Surely we must focus our economies on lifting the billions already on the planet out of poverty and reducing the consequences of our own life-styles on the environment before we demand further populous for purely economic reasons.

Certainly we know that over-crowding is already an issue in many parts of the world and the proportional diminishment of natural resources on a per capita basis also risks the quality of life for individuals in the absence of any major technological breakthroughs.

Australia is not a key contributor to global population however in the quest to reduce emissions we should be leading the way on low impact economic policies rather than having population growth as a corner stone to our prosperity.

The former Australian treasurer, Peter Costello is renowned for his "one child for the mum, one for

child for the dad and one child for the country” rhetoric.

In terms of ecology we know that more human population is dreadful yet as a nation that is the way we have been led and it needs to change. I don't know exactly how, but it needs to change.

Two key issues in Australia that are linked with population are housing affordability and aged care.

Housing Affordability

More people means higher demand for housing and thus prices rise. Good for some and not so good for others. The solution offered by the real estate industry to tackle housing affordability is to release more land. Government has a policy that new land releases should not be deployed over prime agricultural land. Unfortunately this policy has been poorly enforced and urban sprawl around our cities has already consumed much of the prime land and the trend is seemingly continuing unabated.

In addition, urban sprawl is a high emissions proposition because of the implied infrastructure and constant travel however the underlying issue is that ever increasing suburbia is simply not sustainable.

There is limited terrestrial space on the earth and everyone needs a bit for themselves.

Further, by increasing population we compromise export revenue from activities such as mining and agriculture.

For example:

- 1) More agricultural land is consumed by urban interests resulting in less production area.
- 2) More of what is produced undergoes domestic consumption and this leaves even less to generate export revenue.
- 3) The decreased export revenue is proportioned between more people and therefore the actual revenue flowing to each individual is substantially less.

The same can be said for the demands on water and other natural resources.

Aged Care

To support the elderly by ever-increasing the general population is unsustainable because each generation needs to be larger than the one before it and thus the problem becomes perpetually bigger. That is not a solution.

Aged care is touted as one reason for increasing population and I think that concept is relative to supporting the value of the elderly's assets as demand increases from one generation to the next as much as it has to do with medical and social support.

We need to seek economic, personal and technological solutions for aged care rather than relying on population growth.

Additionally, if we believe that collective emissions reductions across all walks of life are required for the collective fight against global warming then ever sector needs to be scrutinised.

With respect to aged care, if people that are suffering drawn out and undignified deaths want euthanasia services then who has the right to deny it?

Costly resources that are currently tied up in tending those on deathbeds, who would otherwise prefer to move on with dignity can be utilised as an emissions reduction or otherwise be re-allocated to more appropriate aged care.

We have legal integrity, medical technology and bereavement services capable of handling euthanasia effectively and perhaps the emission reductions capacity of endorsing euthanasia needs to be looked at?

Not just the reduction in primary energy saved when a breathing machine is turned off, rather the flow on effects that lower overall demand for goods and services and the increased flow rate of assets from one generation to the next has on emissions.

Is it ethical to keep some alive who would rather be dead when their direct emissions and flow on emissions may contribute to suffering for future generations?

These are tough ethical questions.

Where we are faced with massive environmental challenges we need to find better solutions than simply making more people.