

Submission to the Senate Select Committee on Climate Policy

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Summary

Reducing emissions in animal agriculture, particularly methane emissions, will provide by far the most immediate, effective and low cost solution to reducing Australia's total emissions.

This is a significant new proposal, and rather than be seen as a contribution to a successful Carbon Pollution Reduction Scheme (CPRS), we see it as the focus of a leading Methane Reduction Scheme (MRS). The relative contributions to overall emission reduction targets from complementary measures such as renewable energy feed-in laws, energy efficiency and the protection or development of terrestrial carbon stores such as native forests and soils, are minor in comparison to a scheme that involves a rapid reduction in animal agriculture emissions.

Extreme urgency is needed to stem human induced greenhouse emissions. The impact of climate change is already hurting Australians. The Government's current CPRS is largely environmentally ineffective. This inadequacy stems from the Government's 2020 and 2050 greenhouse gas emission reduction targets lack of acknowledgment of the amount and potency of methane produced by animal agriculture; in the light of recent studies, this singular sector accounts for a staggering 40% of Australia's total emissions. These studies have led pre-eminent NASA and Columbia University scientists to conclude that **"sources of non-CO2 greenhouse gases are responsible for virtually all the global warming we are going to see for the next half-century"**¹⁰.

To be effective, a greenhouse gas abatement scheme must use this as a basis when identifying targets and methods to avoid dangerous climate change. Further, climate change is happening far faster than expected and naturally occurring carbon and methane stores are significantly more extensive than previously anticipated, undermining the projected 2020 and 2050 targets, which have consistently underestimated the true extent of the global warming consequences.

An appropriate mechanism for determining what constitutes a fair and equitable contribution to the global emission reduction effort must undoubtedly be both effective in reducing greenhouse emissions and economically viable. The promotion and adoption of a plant-based diet satisfies both of these criteria. We recognise that this may not sit comfortably with some due to the widespread paradigm of unquestioningly promoting one of our primary industries, however the reasoning and substantial evidence for this is compelling.

Australia is setting a dreadful example, and we have a responsibility to act

Australia's unsustainable resource use is strongly evident in Figure 1, which shows the ecological footprint of each country.

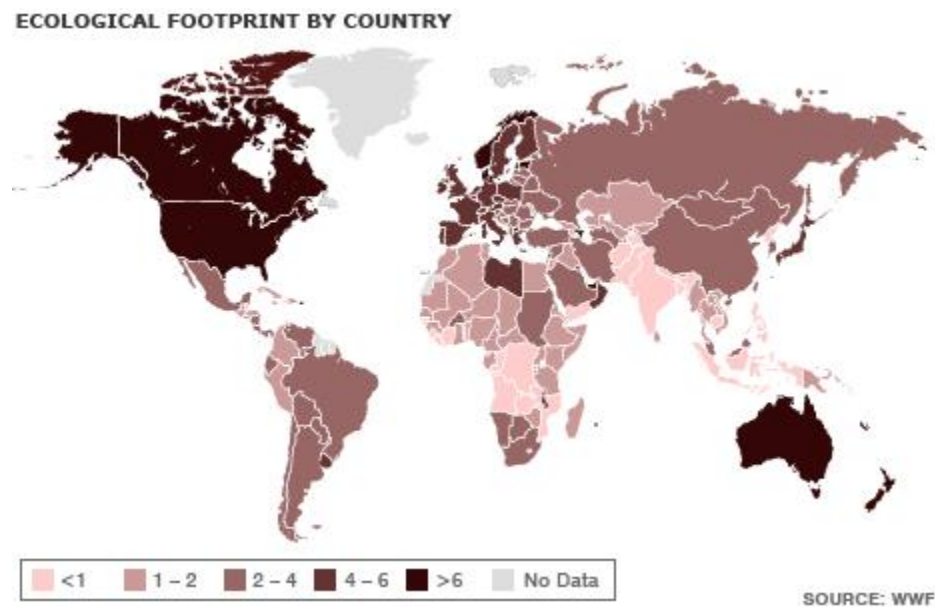


Figure 1: Ecological Footprint by Country⁹

The need for Urgency - Climate Changes are already ravaging Australia

The Intergovernmental Panel for Climate Change (IPCC) observed in its 2007 report that: *'Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.'*¹

It is irresponsible and potentially fatal to give little heed to the increasingly volatile effects of climate change. The total number of natural disasters worldwide has quadrupled from an average of 125 at the start of the 1980's, to approximately 400- 500 annually in recent years.² Over the same period those experiencing the effects of disasters has grown from around 174 million to over 250 million a year with the intensity of these fires, floods, earthquakes and the like mounting³.

We need look not look beyond our own borders to understanding the chilling reality of this. In January and February 2009 bushfires ravaged parts of Victoria, leaving a devastating path of destroyed homes and loss of life in their wake. In September 2007, Euan Ferguson the South Australian Fire Commissioner and the President of the Australasian Fire and Emergency Services Authorities Council foresaw: *'Climate change is having an impact on bushfire severity... there will be times when no force known to mankind can suppress these bushfires.'*⁴ That time is upon us.

CEO of the Climate Institute, John Connor, indisputably confirmed in February 2009 that Victorian fires were those of climate change and that the methods previously applied to fighting and surviving bushfires shall forever remain changed because of our warming planet⁴. In cruel irony, while the blazing infernos were being fought in South Eastern Australia, floods were sweeping through Queensland with two thirds of the state being submerged in water; the estimated cost of damage expected to exceed \$200 million⁴. The mid-north coast of NSW is now also battling floods and Bourke has been declared a natural disaster zone after receiving two-thirds of its entire annual rainfall within 15 hours. The torrential downpour followed an extended period of extreme drought⁴.

The need for Urgency- Non Atmospheric, naturally occurring stores of greenhouse gases are far greater than previously known

It is also necessary when constructing any CPRS or MRS to consider the possibility of a rapid or runaway increase in climate change due to non atmospheric stores of gases. Release of these gases, if significant melting of permafrost were to occur would be catastrophic.

NASA climate scientist Hansen has called for *"a full court press on both CO₂ emission rates and non-CO₂ forcings, to avoid tipping points and save Arctic sea ice and the West Antarctic ice sheet."*⁵ While the human related production of greenhouse gases (GHG's) and current atmospheric emission levels are of paramount concern, this does not canvas the true extent of the global emergency:

- A recent North American study found that it was highly likely that 60 per cent more carbon could be stored in the Arctic permafrost than previously supposed⁶.
- An international study of soil-carbon in the permafrost across the entire Arctic states that levels are double that previously estimated⁶.
- More than 250 plumes of methane have been discovered bubbling up along the edge of the continental shelf northwest of Svalbard⁶.
- The International Siberian Shelf Study found higher concentrations of methane offshore from the Lena River delta⁶.
- It has been calculated that, once begun, thawing of the east Siberian permafrost – believed to contain 500 billion tones of carbon – would be irreversible and that over a century 250 billion tones could be released⁶.
- Concentrations of methane levels in the atmosphere rose in 2007 and 2008 after nearly a decade of stability with higher concentrations detected in both the northern and southern hemispheres⁶.

In short, not only are the emissions related to human activity at all time perilous levels, the earth's ability to safely maintain its own stores is rapidly diminishing and will continue to diminish as warming of the planet continues. Any GHG reduction scheme must factor in this vital evidence. There is also data to suggest that rising temperatures are placing trees under enough stress to reduce photosynthesis. This gives a shorter period of carbon sequestration in the summer season, lowering the overall carbon storage potential of forests⁶.

Surely a government climate policy should tackle the big emitters.

Emission reduction targets from complementary measures such as renewable energy feed-in laws, energy efficiency and the protection or development of terrestrial carbon stores such as native forests and soils are largely superfluous, without acknowledging animal agriculture as a primary perpetrator in overall emission production. The greatest area of concern by far should be the enormous impact of the livestock industry. An article published in *Environmental Science and Technology*⁷, compared the life cycle GHG emissions related to food production, against long distance distribution of that food (ie 'food miles'). The findings clearly demonstrated that '*GHG emissions associated with food are dominated by the production phase*', with transportation only attributing to 11% of life-cycle GHG emissions. In short what we choose to eat can have more impact on achieving CPRS targets even than choosing locally grown food. The study confirmed red meat to be the most GHG intensive food group and that a '*vegetable-based diet achieves greater GHG reduction than buying all locally sourced food*'.

It is undeniable that human beings are creatures of habit. Many will state incredulously that a serving of red-meat a few times a week couldn't possibly be contributing that significantly to global warming in a desperate bid to avoid a change in diet. Consider this however- The United Nations confirmed in its report '*Livestock's Long Shadow*'⁸ that the meat industry at its current capacity produces more GHG emissions than all forms of transportation worldwide. Indeed a reluctance to acknowledge the harmful effects of animal industries has been widespread but some experts are acutely aware and have spoken out:

- At a press conference in Paris held in January 2008, the Chief of UN's Intergovernmental Panel on Climate Change (IPCC), Mr. Rajendra Pachauri said:

"Don't eat meat; ride a bike, and be a frugal shopper - that's how you can help brake global warming." He said, "This is something that IPCC was afraid to say earlier, but now we have said it."

- In his endorsement of the askMOREnow.com campaign, the president of the Australian Conservation Foundation, Professor Ian Lowe confirms:

*"Climate change is a real and urgent threat to our civilisation and to the natural systems of Australia. We all have to make an effort to reduce our individual contribution to greenhouse pollution. **One of the easiest ways to do this is to reduce our meat consumption.** Start by doing without meat one day a week, then spread the practice to more days. You'll be surprised how easy it is to make a significant difference".*

Until recently the livestock and associated animal industries were believed to constitute over 30% of Australia's total emissions, based on CSIRO and University of Sydney Balancing Act report²². This has proven to be a highly conservative calculation as Russell²³ points out, recent IPCC reports state that methane is not 21, but 72 times more potent than carbon dioxide over a more realistic 20 year period. Calculations based on the latest Greenhouse Gas Inventory for Australia show that using this more accurate potency factor of 72 reveals

that animal industries contribute to an enormous 40% of Australia's total GHG emissions!²⁴ (These figures include all aspects of animal industries, including tree clearing for grazing)

The purpose of any climate policy must be to minimise, or ideally to drastically reduce, harmful emissions. To achieve this to any significant degree, any CPRS must consider the impact of the animal industry and the production of methane. In the face of the overwhelming evidence, any reluctance to do so can only be viewed as gross negligence.

A spreadsheet²⁵ of these contributions using this global warming potential (GWP) factor of 72 for methane, can be graphically represented as in Figure 2 below:

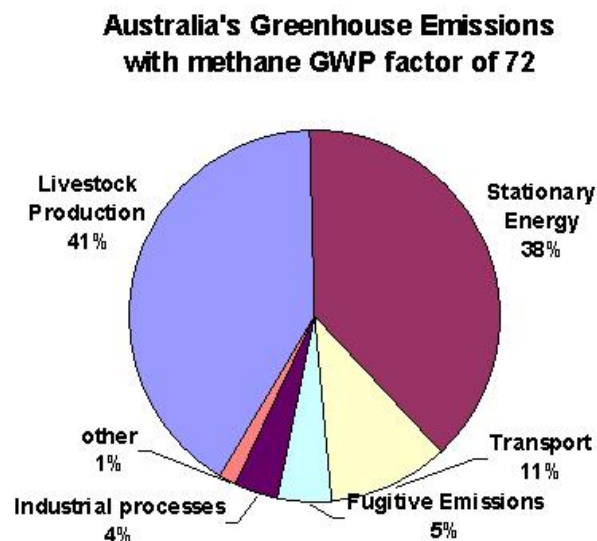


Figure 2: Australia's Greenhouse Emissions with the IPCC global warming potential factor of 72, rather than the factor of 21 used by the DCC inventory, taken from Attachment 2²⁵

The Methane Reduction Scheme (MRS) -a more effective and less costly alternative to curbing CO₂ emissions

The Government's current CPRS is largely environmentally ineffective. This inadequacy stems from the Government's 2020 and 2050 greenhouse gas emission reduction targets lack of acknowledgment of the amount and potency of methane produced by animal agriculture. Studies in 2001 and 2002 by NASA and Colombia University scientists, including James Hansen, a pre-eminent climate scientist, concluded that **"sources of non-CO₂ greenhouse gases are responsible for virtually all the global warming we are going to see for the next half-century"**¹⁰.

This may come as a surprise, and is due to the dramatic rise in non-CO₂ emissions, most notably methane (CH₄) as described above. Hansen also addresses a factor that is closely linked with greenhouse emissions, but rarely discussed: the fact that aerosols are released with most CO₂ emissions, which counteract the warming influence of CO₂. He states that **"CH₄ has analogies to CFCs. Technologies are within reach for reducing CH₄ emissions. As**

with CFCs, the cost of actions to reduce CH₄ can be much less than the cost of dealing with CO₂...the cost of actions to reduce methane (emissions) can be much less than the cost of dealing with CO₂... Methane..provides an opportunity for a global success story. A halt and even reversal of its growth is possible, it could occur quickly, and it could provide an example for cooperation on CO₂." ¹⁰

Hansen argues for assigning methane a higher global warming potential (GWP), and the IPCC have agreed, giving it a GWP value 72 times that of CO₂ over a 20 year period¹¹. Their argument is based on the high potency of this gas, and its quick decay in the atmosphere. Methane has a half life of seven to eight years in the atmosphere; that is after this time half is broken down into other gases. However, carbon dioxide persists in the atmosphere for hundreds of years.

A 2005 paper by Noam Mohr of EarthSave International examines this data in terms of our diet, concluding that *"by far the most important non-CO₂ greenhouse gas is methane, and the number one source of methane worldwide is animal agriculture"*, and that *"if we wish to curb global warming over the coming half-century, we must look at strategies to address non-CO₂ emissions. **The strategy with the most impact is vegetarianism**"*¹².

A recent article in New Scientist¹³ reports that *"Cutting back on beefburgers and bacon could wipe \$20 trillion off the cost of fighting climate change. That's the dramatic conclusion of a study that totted up the economic costs of modern meat-heavy diets. The researchers involved say that reducing our intake of beef and pork would lead to the creation of a huge new carbon sink, as vegetation would thrive on unused farmland. The model takes into account farmland that is used to grow extra food to make up for the lost meat, but that requires less area, so some will be abandoned. Millions of tonnes of methane, a potent greenhouse gas, would also be saved every year due to reduced emissions from farms. These impacts would lessen the need for expensive carbon-saving technologies, such as "clean coal" power plants, and so save huge sums, say Elke Stehfest of the [Netherlands Environmental Assessment Agency](#) and colleagues."*¹⁴

Australian researcher Bruce Poon has developed a very instructive graph of greenhouse emissions including projections showing the effect of diet on emissions, as shown in figure 3¹⁵.

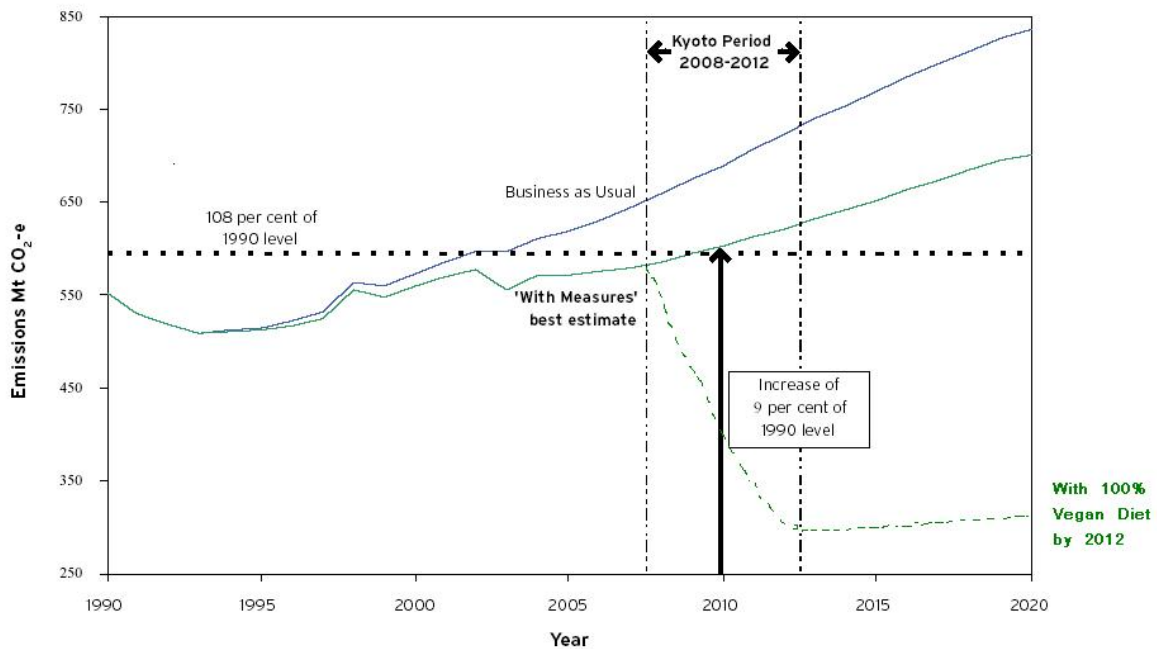


Figure 3: Projected emissions showing the effect of Australians changing to a plant based diet¹⁵.

An appropriate mechanism for determining what constitutes a fair and equitable contribution to the global emission reduction effort must undoubtedly be both effective in achieving identified outcomes and cost effective.

The promotion and adoption of a plant-based diet satisfies both of these criteria, in fact it is the only logical answer. We recognise that this may not sit comfortably with some due to the widespread paradigm of unquestioningly promoting what has been one of our primary industries; however any effective emission reduction scheme must break with tradition as these very norms and ways of thinking are what have allowed human civilization to reach such a precarious point in existence. A scheme with a focus on methane reduction is also viable in other respects. In a world where 179 million people are extremely undernourished¹⁷ yet enough grain is produced to feed the entire population one and a half times over⁸, it does not make sense that the worlds cattle are consuming enough grain to feed 8.7 billion people- more than the entire human population. It is hardly fair or equitable that under our current practice we are significantly contributing to a process whereby edible grain production is diverted into meat, egg and dairy production thus artificially raising the price of grain hundreds of percent in recent years¹⁸. The effect of this is simple- many people are unable to afford a basic commodity let alone the meat that the grain contributes to producing.

A MRS is also beneficial to the Australian economy as it will rapidly curb climate change and related so called 'natural disasters'. The Government stated in a 2001 report that '*natural disasters (with a total cost per event over \$10 million) cost the Australian community \$37.8 billion (including the costs of deaths and injuries) in 1999 prices over the period 1967 to 1999*¹⁹. It is safe to assume that this figure has increased exceptionally in light of the

disasters of 2009; and by all expert accounts will continue unless immediate action is not taken.

There are also further economic gains to be made. Australia has stunning biodiversity; maintenance of which can only increase an already healthy tourism industry. The health benefits of switching to a plant based diet are also numerous. Heart disease continues to be the leading cause of death in most Western nations and Australia is no exception, this is followed closely by cancer and diseases related to obesity. There is significant evidence showing that both diseases are significantly increased by a meat based diet^{8, 17, 18, 20}. Rapid reduction of livestock production and consumption could lead to large savings on public health.

Raising animals for food consumption requires enormous amounts of water. It takes up to 50,000 litres of water to produce 1 kilogram of beef, compared to only 2,500 litres to produce 1 kilogram of white rice, and less still for most fruit and vegetables²¹. Few would argue this to be a bad idea for a country with one of the driest climates on the planet.

We do recognise however that some farms are not viable for cropping, making these potential candidates for government assistance or be investigated as potential carbon sequestration areas for growing trees. Finally, for those farms that can support cropping, converting from animal to plant agriculture is far more sustainable and thus profitable.

Conclusion

To avoid catastrophic climate change, a fresh dynamic approach must be taken that will result in quick reductions in greenhouse pollutants. A Methane Reduction Scheme (MRS) that reduces animal agriculture will deliver this urgently needed result.

A CPRS that ignores animal agriculture will be almost ineffectual in reducing Australia's greenhouse pollution because sources of non-CO₂ greenhouse gases are responsible for virtually all the global warming we are going to see for the next half-century¹⁰. This is because:

- methane is now recognised to have a greenhouse warming potential 72 times more than CO₂, over a 20 year period¹¹; and
- aerosols accompanying CO₂ emissions offset more than half the warming potential of CO₂¹⁰

Calculations based on the most recent Australian inventory reveal that when the global warming factor of 72 is used, an astonishing 40% of our emissions come from animal agriculture²¹. This figure would increase if the offsetting effects of aerosols on CO₂ emissions were taken into account. Attachment 2 is a spreadsheet showing greenhouse emission calculations using this factor of 72²¹.

A windfall benefit to reducing animal industries will be that much of Australia's grazing land that is retired will rapidly regrow to woodland, creating a major carbon sink.

A CPRS that focuses on minimising animal agriculture will deliver a more effective and far lower cost alternative to the trading scheme as it is proposed. Indeed, when public health costs are considered, a scheme that encourages a plant based diet will dramatically reduce costs to the nation.

The conclusion here is clear: animal industries contribute far more in greenhouse terms than other sectors, and reducing animal industries is the most economical and effective means of combating global warming.

Any climate change policy that ignores the enormous impact of this sector is therefore deeply flawed.

Recommendations

We recommend that as a matter of urgency:

1. A Methane Reduction Scheme (MRS) be established to address these dangerous emissions.
2. Any CPRS must include emissions from animal industries.
2. A new Australian greenhouse gas inventory be published that correctly factors the shorter term effect of methane with a forcing factor of 72 as proposed by the IPCC, not 21 as is now the case.
3. An education campaign to reduce meat and dairy consumption is launched.
4. Direct government stimulation of manufacturing industries be offered to produce high protein foodstuffs from plants.
4. A scheme be established to compensate those in the livestock industry that are no longer financially viable.
5. A comprehensive support scheme for farmers to convert from animal farming to plant-based agriculture be implemented.
6. Media controls are enacted on advertising that blatantly encourages a meat based diet despite the disastrous effects it wreaks on the environment, similarly to the anti-smoking legislation and media controls.
7. A national education scheme is launched at primary, secondary and tertiary levels to promote eco friendly practices and a better understanding of the impact of personal choice and its contribution to GHG emissions
8. Low emission products be made GST exempt to encourage consumer purchase
9. Establish a mechanism to allow open and honest dialogue between stakeholders that moderates the influence of well funded industry lobbyists.

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Attachment 1

Our Organisation and our climate change awareness activities

Our organisation is a non-profit humanitarian spiritual organization involved with promoting world peace through meditation and a vegetarian lifestyle based on compassion for all beings. We feel strongly that mankind's abuse of our environment is pushing our world to the brink of ecological collapse. In 2008, we began an Australian media campaign to stress the urgency of climate action to limit dangerous greenhouse gas emissions, including the large but little known impact of animal emissions.

Our organisation has been actively involved in raising awareness of dangerous climate change for several years, most recently with the national www.askmorenow.com media campaign in 2008/9. We produce a global constructive TV channel www.suprememastertv.com, broadcasting on all continents via free to air satellite and hosted by various cable operators, in addition to the internet feed. Our global website urging climate action is www.suprememastertv.com/SOS-Global-Warming.php.

The www.askmorenow.com Australian media campaign stresses the urgency of climate action, and alerts Australians to the large impact of animal emissions. We are currently running a 30 sec ad on SBS and in print and billboard media. Our current campaign can be summarised as:

"By changing our diet we can make a difference

Greenhouse emissions from farmed animals are made up of direct emission of methane from enteric fermentation in ruminants (cows, sheep, goats); from tree clearing to provide pasture for grazing animals; plus smaller amounts from transport, refrigeration and processing. Changing to a plant-based diet requires only a fraction of the land and resources now devoted to agriculture, because over half of all grain is fed to animals in a very wasteful process whereby 16kg of grain is required to produce 1kg of meat. Supporting evidence for these statements comes from reports such as :

- The 2005 CSIRO/University of Sydney Balancing Act report which attributes 30.6% of net greenhouse gas emissions to animal industries;
- The Department of Climate Change National Greenhouse Gas Inventory 2006;
- The 2007 UNFAO report Livestock's Long Shadow which discusses the large greenhouse emissions and environmental impact of animal farming.

Changing to a plant-based diet reduces these greenhouse emissions and environmental impacts.

Go veg

Be green

Save our planet

Here we are urging people to take action to reverse the global degradation we are causing by changing diet and acting in an environmentally responsible manner."

Attachment 2

Spreadsheet of greenhouse emissions of animal industries using the latest IPCC global warming potential factor of 72 times that of carbon dioxide.

	N2O (Gg)	CO2-e (Gg)	CH4 (Gg)	CO2-e (Gg)	CO2 (Gg)	Total CO2-e (Gg)	Govt CO2-e (Gg)	CHK Gov't CO2-e (Gg) where GWP for CH4 = 21, GWP for N2O = 310	Animal Production emissions CO2-e (Gg)	Plant Production emissions CO2-e (Gg)
Australia's total emissions							576,035.43			
Agriculture total	65.55	18943.95	3,323.35	239281.2		258,225.15	90,111.69	90110.85		
								0		
Enteric Fermentation	0	0	2,822.35	203209.2	0	203,209.20	59,269.41	59269.35	203,209.20	
Cattle - non-dairy	0	0	1,840.62	132524.64		132,524.64	38,653.09	38653.02		
Cattle - dairy	0	0	323.91	23321.52		23,321.52	6,802.13	6802.11		
Other Livestock	0	0	1.03	74.16		74.16	21.54	21.63		
Buffalo	0	0	0.34	24.48		24.48	7.17	7.14		
Sheep	0	0	646.2	46526.4		46,526.40	13,570.21	13570.20		
Goats	0	0	2.31	166.32		166.32	48.46	48.51		
Camels and Llamas	0	0	0.08	5.76		5.76	1.78	1.68		
Horses	0	0	3.98	286.56		286.56	83.55	83.58		
Mules and Asses	0	0	2.89E-03	0.20808		0.21	0.06	0.06		
Swine	0	0	3.88	279.36		279.36	81.41	81.48		
Poultry	0	0	0	0		0.00	0	0.00		
Manure Management	5.12	1479.68	94.21	6783.12		8,262.80	3,564.28	3565.61	8,262.80	
Cattle - non-dairy	3.33	962.37	4.52	325.44		1,287.81	1,128.50	1127.22		
Cattle - dairy	2.87E-02	8.2943	25.42	1830.24		1,838.53	542.75	542.72		
Other Livestock	0	0	5.57E-04	0.040104		0.04	1.17E-02	0.01		
Buffalo	0	0	3.21E-04	0.023112		0.02	6.74E-03	0.01		
Sheep	0	0	0.17	12.24		12.24	3.58	3.57		
Goats	0	0	1.32E-03	0.09504		0.10	2.77E-02	0.03		
Camels and Llamas	0	0	8.46E-05	0.0060912		0.01	1.78E-03	0.00		
Horses	0	0	6.35E-03	0.4572		0.46	0.13	0.13		

Mules and Asses	0	0	3.74E-06	0.00026928		0.00	7.85E-05	0.00		
Swine	0.09	26.01	61.86	4453.92		4,479.93	1,326.04	1326.96		
Poultry	1.67	482.63	2.23	160.56		643.19	563.24	564.53		
Rice Cultivation (flooded)	0	0	12.6	907.2	0	907.20	264.69	264.60		907.20
Agricultural soils	49.05	14175.45	0	0	0	14,175.45	15,206.75	15205.50		
Direct Soil Emissions 15.24 N2O										
Synthetic Fertilisers	8.54	2468.06	0	0	0	2,468.06	2,648.39	2647.40		2,468.06
Animal Waste Applied to Soils	2.26	653.14	0	0	0	653.14	701.43	700.60		653.14
Nitrogen Fixing Crops	1.81	523.09	0	0	0	523.09	562.11	561.10		523.09
Crop Residue	2.57	742.73	0	0	0	742.73	796.6	796.70		742.73
Cultivation of Histosols	0.05	14.45	0	0	0	14.45	15.59	15.50		14.45
Animal Production 13.27 N2O										
Nitrogen Excretion on Pasture Range and Paddock	13.27	3835.03	0	0	0	3,835.03	4,113.82	4113.70		3,835.03
Indirect 20.54 N2O		0	0	0	0	0.00				
Atmospheric Deposition	11.84	3421.76	0	0	0	3,421.76	3,669.50	3670.40		3421.76
Nitrogen Leaching and Run-Off	8.71	2517.19	0	0	0	2,517.19	2,699.31	2700.10		2517.19
Prescribed Burning of Savannas	11.05	3193.45	383.35	27601.2	0	30,794.65	11,476.62	11475.85		30,794.65

Savanna Grassland	3.06	884.34	99.77	7183.44	0	8,067.78	3,044.95	3043.77		
Savanna Woodland	7.92	2288.88	281.3	20253.6	0	22,542.48	8,362.05	8362.50		
Temperate Grassland	0.07	20.23	2.28	164.16	0	184.39	69.62	69.58		
Field Burning of Agricultural Residues	0.33	95.37	10.84	780.48		875.85	329.95	329.94		329.95
Land Use, Land-Use Change and Forestry total (sources and sinks)	1.81	523.09	97.88	7047.36	37,352.61	44,923.06	39,969.83	39969.19		
Afforestation and reforestation		0	0	0	-22,958.81	-22,958.81	-22,958.81	-22958.81		
Land use change (deforestation)	1.81	523.09	97.88	7047.36	60,311.41	67,881.86	62,928.64	62927.99		
Land converted to cropland	0.56	161.84	30.5	2196	3,154.13	5,511.97	3,969.83	3968.23		5,511.97
Land converted to grassland	1.25	361.25	67.37	4850.64	57,157.28	62,369.17	58,958.82	58959.55	62,369.17	
						Total calc'd emissions with 20yr GWP's for CH4 & N2O	Govt calc's from AGEIS	Difference		
Agriculture + LandUse, LandUse Change						326,107.01	153,040.33	173,066.68		

