

Carbon – the New Diamond for Australian Agriculture

A Study of Climate Policy for Australian Farmers



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Foreword

Diamonds are made from carbon under pressure – a powerful analogy for the way carbon is set to become the new “agricultural diamond”, allowing farmers to engage with developing commodity markets but most importantly, to build up their productive capacity in their greatest asset – the soil. The challenge for Australian farmers comes not with the climate science but with the associated policy, and that is the focus of this report. The mechanisms driving climate change are complex; this report outlines the key climate change issues in lay language. Knowledge gives us the power to make good policy decisions.

The report’s major finding is that carbon dioxide (CO₂) emissions have been the focus of the policy debate, when the real driver of climate change is energy. The debate over “human-induced” climate change debate has neglected the key issue of the replacement of non-renewable energy sources with renewable ones, which would reduce overall emissions from industrialised economies. Cheap fossil fuels have driven economic growth to date, and under current conditions the available renewable replacements are expensive. Rectifying this economic problem requires a regulated market-driven solution – in effect, the creation of a new commodity in the form of tradeable carbon. International and domestic carbon markets already exist, but are not in effect on a global basis. An international carbon industry will be influenced by international policy frameworks, the implications of global trading, food security, soil sequestration, renewable energy projects, offsets, mitigation and adaptive capacity. In addition, before Australian farmers can engage in carbon trading, the fundamentals of accounting, monitoring, auditing, verification, registration and ownership must be established and understood.

Agricultural participation in carbon markets, whether compliance-driven or voluntary, will be fundamental to the markets’ success. Farmers own much of the infrastructure in which carbon can be stored and where renewable energy options can be located. This report argues that carbon payments are likely to become part of Australian farmers’ enterprise mix; for this to occur, farmers must be positioned to receive carbon payments to offset the differential in commodity prices that results from the application of low-carbon or carbon-positive agricultural practices. If climate change policy becomes law, then as farmers we must put that “diamond” ring on our fingers and forget about carbon celibacy.

As the world’s environment ministers returned home after the Copenhagen Climate Change Conference (COP15) in late 2009, many felt the talks had failed. In terms of emission target

agreements this was true, and there was a danger that the loss of momentum would further hamper countries struggling to adopt relevant domestic legislation. Nevertheless, the COP15 talks produced some positive signs. COP15 highlighted many major global issues – the role of the less developed world, food security, future global population growth, catastrophic climate events and their consequences, the difficulties of international negotiations, the impacts of changing climate on political stability, and the effect of ignoring today’s problems on our children’s futures (intergenerational equity).

Australian farmers’ engagement in this new and unknown frontier will be complicated; new technology and increased research & development funding will be a main driver of the solutions. Nevertheless, there will be huge opportunities for farmers to contribute to economic, environmental and social sustainability – giving us security as food producers and renewable energy suppliers for the world’s future. This century marks the beginning of a brave new world, one in which the diamond rings on our fingers will be, literally and metaphorically, made from carbon.

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Abbreviations

ACCC	Australian Competition & Consumer Commission
CANDU	Canadian Deuterium Reactor (pressurised heavy water reactor)
CAP	Common Agricultural Policy (European Union)
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CO ₂	Carbon Dioxide
COP15	15 th meeting of UNFCCC Parties in Copenhagen, 2009
EPA	Environment Protection Agency
ESG	Economic, Social & Governance
ETS	Emission Trading Scheme
EU	European Union
FICAT	Forest Industry Carbon Assessment Tool
GHG	Greenhouse Gases
GM	Genetically Modified
IFAP	International Federation of Agricultural Producers
IMF	International Monetary Fund
KP	Kyoto Protocol
MAC	Marginal Abatement Cost
MERET	Managing Environmental Resources to Enable Transition
NFU	National Farmers Union (USA)
R&D	Research and Development
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
WWF	World Wildlife Fund

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Executive Summary

What's the fuss about carbon? Is the world in the ultimate environmental "spin"? These are some of the questions addressed by the research described in this report.

The global scientific consensus is that climate change is real and serious. The implications for the farming sector include the need to feed the world's growing population while balancing conflicting land use obligations and the effects of climate change on agricultural production. Agriculture is a small part of the cause but potentially a large part of the solution. That's why Australian farmers need to engage in the Climate Change and Carbon Policy. As a farmer I wanted to learn about how it all works the connectiveness of the accounting, the trading, the economic carbon systems, the preference of "cap & trade", Carbon tax or a regulatory approach, the role of renewable energy, carbon labelling, international policy and the impacts of the GFC and the commodity of carbon. The implications for an average Australian farming business, the opportunities or threats as I saw them globally and reviewed them for Australian adoption. The aims of the report were to observe, question and review the issues involved with carbon policy across a mix of developed and emerging countries that were involved in international negotiations. This included visits to China, Philippines, Japan, USA, Canada, Denmark, UK and Italy. As well as undertaking a Carbon Accounting short course at Swinburne University and Carbon Trading Workshop with Point Carbon in Washington DC and a week in Copenhagen during the COP 15 Conference.

These recommendations and findings are aimed at Australian farmers, their commodity groups and governments. As the results are linked closely to the recommendations particularly due to the infancy of the policy they will be of significance to those interested in the emerging industry itself. The cap and trade system appears to have global favouritism, but a domestic Australian response to the emission and energy requirements should take the form of a carbon or energy tax. This could be administered by a system similar to the Reserve Bank. Carbon revenue should be separated from general revenue and redistributed to fund social and economic justice and to pay for new renewable energy technology conversion. The domestic response should be aimed at transition to renewable energy and offset markets rather than being driven by global emissions targets. Australia needs an industry-approved Low Carbon Transition Plan to guide us through the development of voluntary markets and towards compulsory markets. The accounting challenges and the compliance costs associated with managing and trading soil carbon will require a huge amount of revenue and time allocated directly to the agricultural sector. Soil sequestration must be recognized by

international agreement and this will require enforceable accounting regulation for it to deliver carbon prices. In Australia, farmers should be part of an adaptation and mitigation industry related to renewable energy infrastructure, not just as ‘carbon farmers’. Their regional economies should be the focus of carbon trading, renewable infrastructure development and the new “green jobs” sector. Constructive governmental consultation will be essential and Australian rural & regional areas should target its attraction.

Introduction

In Finley NSW our farming business has been impacted by environmental legislation in the areas of vegetation & water. I could see the development of another environmental commodity coming in the form of Carbon but this time I wanted to understand the policy before it was developed. The issues around Climate Change policy in my community were getting bogged down in the acceptance of the science and as I was neither a scientist nor an agronomist I just wanted to understand the issues from a farmer's point of view. This is what prompted me to apply for a Nuffield Scholarship and what led me around the world trying to piece together the complex parts of Climate Change Policy and the world of Carbon.

The beginnings of my research were to try to understand the language that the sector used as this is the easiest way in infant policy development to feel excluded from the issues. I enrolled in short course in Carbon accounting at Swinburne University in Melbourne prior to my Nuffield travel. The GFP was instrumental in obtaining a global position for agricultural generally and this then led to a refined itinerary covering the issues as I saw them. These issues included Carbon Accounting, ETS options, Food Security, Carbon Labelling, Renewable Energy sector, Carbon Trading, International agreements and Climate change regulations. These issues were then defined in relation to Australian Agriculture and ultimately the impacts on policy and adoption for farmers themselves.

Climates have never been “fixed” and climate variability has been a challenge for food producers for centuries, yet whether humans have induced or accelerated this process is a lesser debate. If the climate scientists have got it right or wrong – none of us will be around to say ‘I told you so’. Greenhouse gases are global pollutants that require global approaches, and the problem is too large and important to use markets as the only tool to drive the remedy. The focus on international and domestic climate change policy must continue, and governments must not be distracted from developing mechanisms to address the reality of climate change. This is a complex topic. Anyone who follows the news media knows that there are climate change ‘deniers’ and climate change ‘believers’, and a whole lot of us between the two extremes. Meanwhile, as exemplified most recently at the December 2009 Climate Change Conference in Copenhagen (COP15), international policymakers have failed to agree on setting emissions targets and developing carbon markets. Despite repeated setbacks to the development of an international response, climate change is increasingly recognised as a problem, particularly by citizens, and there is little doubt that the world will

eventually take steps to avert it. How these steps affect and provide opportunities for Australian agriculture is the focus of this report.

Agriculture and climate have fundamental linkages. Changes in weather patterns directly affect agricultural performance. As farmers, we need to understand future weather patterns and how we can secure our returns in the future. The keys are knowledge, technology and capacity building, all of which enable farmers to mitigate the effects of climate change and adapt to provide solutions, as well as harvest returns in the carbon markets (the new ‘green’ economy). How well we do this is dependent on understanding and engaging with the fledgling carbon industry and climate change policy, rather than exhausting ourselves in trying to oppose the science. Agriculture needs to be working at the coalface of climate change policy, influencing the rules and the development of responses.

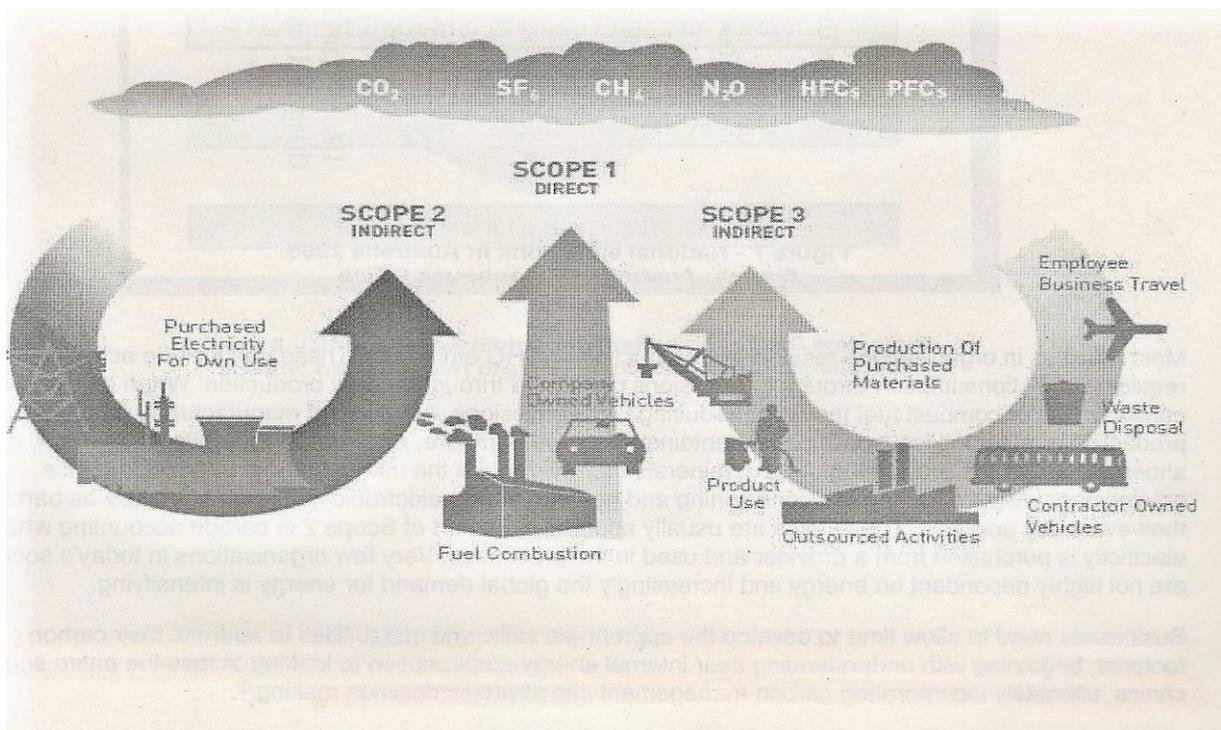
This report describes the outcomes of research conducted by the author via interviews with climate change policymakers and opinion leaders, and observations at international climate change conferences and events, between February and December 2009. The following chapters outline the major findings with respect to the implications of climate change for Australian farmers. The report concludes with recommendations about the way Australian agriculture should respond to the challenge of climate change.

Chapter 1 – Carbon Accounting

Carbon Accounting is based upon rules established within the Kyoto Protocol. There are basic accounting rules for business to comply with and voluntarily operate to reduce its carbon footprint. The first step is to undertake a carbon audit of a business's operations. This involves:

- Establishing the boundaries of the organisation
- Recognising the different scopes of emissions (see Figure 1)
- Calculating the emission rates and conversions of these operations
- Formulating the bottom line and reporting emissions.

Figure 1 - NGERs GHG Protocol Emissions Scope 1, 2, 3 Source: GHG Protocol



When the carbon audit is complete you can then look at ways in which you can lessen the emissions produced. *Adaptation* is about the capacity to change what we do in response to risk associated with climate variability (something that farmers all over the world do daily). *Mitigation* refers to the set of responses to markets or legislation that require us to offset our behaviour, creating carbon reduction via abatement options.

Farmers need to be able to quantify their emissions; currently the best way to do this is via a GHG calculator. These are available online (one of the best for farmers is the Australian Farm Institute FarmGas online calculator – available at <http://www.farminstitute.org.au/>). Another useful tool is the International Finance Corporation’s Forest Industry Carbon Assessment Tool (FICAT – www.ficatmodel.org). The FICAT model is divided into 10 elements: land-based carbon, carbon in products, manufacturing emissions, emissions from forestry operations, emissions associated electricity purchase, transport emissions, emissions from product use, emissions from end-of-life, and avoided emissions.

A case study of a Uruguayan business with 60,000 hectares of forest and a paper mill found that the scope 1 & 2 emissions were a small part of the emissions footprint and the most important was end-of-life landfills producing methane (CH₄, a very potent greenhouse gas). Many of the current premises of carbon policy are based on businesses that have not completed a carbon audit; this “footprinting” is vital for a proper understanding of the carbon mitigation and adaptive possibilities.

Governments need to resource carbon audits and target them early in the policy process. Small to medium size business that don’t have the skills, resources or ability to outsource this accounting process must have access to tools and measurement models for carbon assessments; this will be the key for engagement and support for any new climate change legislation in the small business sector in Australia. It will spark engagement and develop skills and valuable input into the operations of carbon policy at domestic and international levels.

Some of the most pressing accounting issues to be addressed that required immediate focus in legislative processes dealing with the agricultural sector are:

- **Lack of skills, time, resources and staff trained in the relevant accounting practices.** In a recent Australian report it was found that “although 71% of business identified cost savings through developing an emissions inventory, only 11% of businesses have subsequently implemented emission reduction initiatives”.¹ Many have done carbon audits and have quantified their emissions inventories, yet they have failed to adopt new practices. Adaptation and Mitigation will not be achieved until the rules are clear, simple and resourced, especially for small business. Legislators need to understand that “33% of all carbon accountants claim inadequate access to the required supporting data as the primary barriers to reporting of carbon emissions”.²
- **Accounting rules are often based on overseas data and differ between regions.** For example, the double cropping (annually) of many Asian rice producers means that a country by country approach is required for accurate accounting conversions in the rules. This complexity in agriculture means that there is no constant equation – soils and the environment vary. Changes in soil carbon in particular take time and accurate accounting is still controversial; this problem requires immediate attention at international levels.
- **Fraud and compliance.** ‘Carbon fraud’ (for example, claiming offsets that do not exist) is already an issue and the formation of active carbon contracts and markets will accentuate this. The Australian Competition and Consumer Commission (ACCC) found that in 2009 Australians (mostly small investors looking for “ethical investment” opportunities) lost 3.5 million dollars in fraudulent carbon offset schemes. Investors need to understand the carbon accounting process to make sure that their investment in companies is sound. It will be easy to overshadowed by the commitment to environmental participation rather than correct accounting process. Regulatory bodies and investors require an understanding of carbon accounting and verification processes associated with offset projects. Carbon fraud has the potential to damage this virgin industry considerably.

¹ Accounting for the cost of Carbon – National centre for Sustainability p.5

² Accounting for the cost of Carbon – National centre for Sustainability Swinburne p.7

Australian farmers should seek to develop regionally-based marketing networks to create savings in compliance, resources, marketing their carbon, as well as utilisation for adaptive advantages. Regional ownership is also the key to building the capacity, extension, research and development required to drive regional growth in carbon markets. Australian farmers need to collectively access capital to generate the skills and technology to reduce their regional emissions profile and increase individual returns in carbon markets.

Clear, simple rules are important, and the legislation governing the accounting rules needs to be driven by simplicity which in turn will be reflected in uncomplicated record keeping. New carbon legislation will drive software applications which will permit data from the paddock to be easily integrated into farm computing systems. Legislation and compliance market development will trigger better record keeping methods. If farmers can gain knowledge about their carbon accounting prior to the introduction of legislative processes, this will help them influence and create cost-effective and accessible carbon markets. Farmers' organisations could act as aggregating agencies; in Iowa, the Farm Bureau developed the Agra Gate Climate Credits Corporation³. Its success has been limited but the model has potential for refinement. Finally, the transaction cost of reporting and administration is a substantial burden for business, therefore the verification of reporting requires consideration even at international policy levels.

³ Iowa Farm Bureau Federation Carbon Credit Aggregation Program - AgraGate Climate Credits Corporation 2007

Chapter 2 – The New Carbon Economy: What Shape Will It Be?

Regional development and farming sector expertise should be big winners in the new “green-collar” sector, but for this to happen agricultural and environmental jobs need to be targeted early in the introduction of climate change policy to make an easier transition to a low carbon economy. This is a real opportunity for our regions and commodity sectors, and could lead to the creation of a series of “bio-regions”; these will highlight the differences in carbon storage potential for competing rural economies as well as driving prices in carbon markets.

Discussions with people all over the world highlighted the importance of an integrated approach to climate change skills and education development. One of the issues is that the scientists have failed to understand the impacts of their findings on economies and people, resulting in a lag in policy uptake. Education about climate variability, risk management, energy markets, carbon markets, policy and accounting will help all countries participate more effectively in the solutions to climate change.

The corporate sector leads the way in establishing the new ‘green economy’; many large corporations have already established carbon/environmental divisions (although much of this is about image rather than corporate responsibility) and relationships with major environmental groups. Similarly, the agricultural sector should not be afraid to get involved with environmental groups. The corporate sector manages these relationships much better than the farming sector. Agricultural and environmental groups sometimes clash, especially when environmental legislation directly impacts on the on-farm management of natural resources. Nevertheless, as environmental commodities become more defined by markets and price sensitivity, we as farmers need to redefine our relationships with the different stakeholders.

New ‘green-collar’ jobs will be created as the renewable sector matures. The role that farmers and agriculture professionals will play in this will be defined by training in technology and science and how those skills can be transferred into Climate Change management and agricultural jobs. As the demand for ‘green sector labour’ increases it needs to be met with a corresponding educated supply. It became an observation in Asia, UK and USA that there

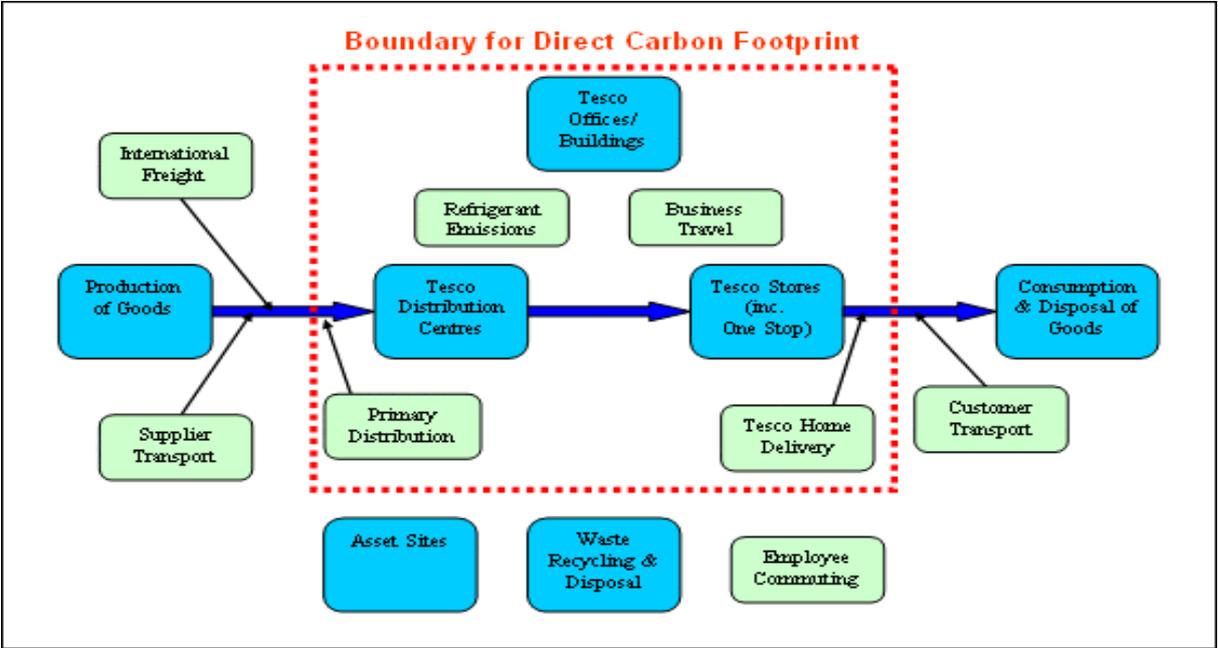
have been pressure in funding some of their agricultural education programs; this needs to be addressed as the key to movement into ‘green – collar’ jobs will require such programs to be expanded rather than closed.

Carbon Labelling

Carbon Labelling is driven by image and markets rather than demands from consumers as a decision making tool. As people develop a basic understanding of carbon accounting they will automatically recognise products with high carbon inputs. Complex labelling systems will add significant costs of compliance for business. As the concept of carbon neutrality is used in consumer marketing farmers need to be aware of the implications for supply chain compliance.

Large supermarket chains are developing carbon as a corporate strategy for their products, but whether it continues to be used for marketing advantage or represents a real shift towards compliance in supply chain obligations remains to be seen. Basically, green profiles pay off in businesses’ bottom lines. The consumer appetite for ‘carbon neutral’ products is driven by public perception that activities that do not add more GHG into the atmosphere are worth paying for (see Figure 2). The introduction of carbon audit compliance and accounting procedures underpins this carbon neutrality. Carbon labelling could become yet another supply chain obligation for agriculture to bear – something to be discouraged at all costs.

Figure 2 - How Tesco (UK) establish the boundaries for Carbon Footprinting of Products



Chapter 3 – Climate Change Policy

Instruments

Cap and Trade

A cap and trade system is defined as an emissions trading system whether total emissions are capped or limited. Cap and trade was employed in the Kyoto Protocol: emissions from Annex B countries are capped, and any excess permits are tradeable. (Annex B countries are Australia and 38 other emissions-capped countries listed in the Kyoto Protocol.)

Cap and trade systems set national limits on GHG emissions. In the early years Governments can create free emissions permits or allowances, and eventually transition to an auctioning system to raise revenues in regulated/capped sectors. Offsets can be created from reductions in emissions through covered sectors or via increases in sequestered carbon in uncapped sectors⁴. The agricultural sector can play a major role in providing carbon offsets – very likely at lower costs than most other sectors and therefore could return a competitive carbon price in markets.

Cap and trade is the preferred system because it has international acceptance thanks to the Kyoto Protocol. Nevertheless, the cap and trade system is far from perfect. For example the European Union (EU) carbon market has been in place since 2005 and while European power companies are keen to factor carbon prices into their future plans, they still want to retain their existing government subsidies. Carbon prices alone haven't yet been sufficient to shift the EU's industry directly into low carbon energies, but they are clearly part of long-term planning.⁵

The EU farming sector prides itself on the fact that it is “Meeting society's needs and expectations”⁶. There is massive support across the EU for their Common Agricultural Policy (CAP), which supports farmers in balance with the needs of consumers, markets, society and political stability. The CAP helps to keep environmental policy linked closely to agricultural practices, as the EU farming sector is driving to become more sustainable, it will continue to receive substantial environmental payments as product-based subsidies are reduced. A similar

⁴ Carbon Accounting Workbook Swinburne University

⁵ EU Market Reports 2009

⁶ EU Common Agricultural Policy Lecture Brussels 2009

situation applies in the United States, which is keen to adopt a cap and trade system driven by market forces and carbon prices, but is still committed to maintaining substantial farm payments (including for shelter-belt biodiversity works which can be simultaneously claimed as carbon offsets). There are mixed messages here; market based systems are providing returns and incomes which being supplemented by government payments for meeting citizens' environmental expectations.

Carbon Tax

A carbon tax is defined as a tax applied to CO₂-equivalent emissions; it is a price-based measure designed to change consumer behaviour (similar to a consumption tax). It may be targeted at particular areas of the energy, industry and transportation sectors.

The best approach to a domestic carbon tax would involve isolating carbon tax revenue from general tax revenue and investing it in technology, research and development relating to carbon mitigation projects. It could be administered by a body similar to the Reserve Bank. This model would provide revenue that could address issues immediately and be less reliant on international policy regulations. It would operate in tandem with voluntary carbon markets, and could accelerate the shift from carbon-based to renewable energies and at the same time develop carbon market participation. As an initial response, a carbon tax avoids many of the complexities of a cap and trade system. New taxes are invariably politically fraught, but equally the implementation of national emissions trading scheme (ETS) is also proving politically unpalatable worldwide.

Regulatory Approach

In the United States, regulatory approaches to environmental problems are often established without government legislation, but administered and enforced by the EPA.

Under the Clean Air Act, the EPA already has powers concerning many forms of emissions. A US study found that if agricultural emissions are regulated by the EPA "Net farm income is projected to fall below baseline projection....higher input costs with no opportunity for GHG reductions services that the sector provides as well as that 60 million acres of cropland could be converted to forests & grasslands.." ⁷ Many moderate US Senators have supported the extension of the EPA's powers to agriculture, and many voices in Washington articulate the

⁷ Analysis of the Implication of Climate Change & Energy Legislation to the Agricultural Sector" p. 19

benefits of soil sequestration. The EPA and the USDA continue to negotiate over the issue; the US agricultural sector is clearly of the view that the USDA is the appropriate regulator for agricultural carbon emissions. A regulatory rather than market-based or taxation-based approach to agricultural carbon means bureaucratic verification of emissions and high compliance costs.

Chapter 4 – International Policy:

Copenhagen & the Global Financial Crisis

Politicians are the key to progress on carbon emission if we cannot achieve political commitment then the outcomes are unachievable. The lack of agreement on emission targets meant that COP15 was generally considered a failure. Nevertheless, some progress was made in Copenhagen, notably a much greater understanding of the barriers to a climate change solution. This international meeting had a huge following globally where the media's role was significant in the global discussions of the issues and their complexities. COP15 was ultimately about trust and money in the tussle between the developing and developed countries – the emission targets were left on the sidelines.

The relationships between more developed countries and the populous but economically less developed countries in establishing emissions targets, carbon markets and environmental outcomes was the stumbling block for Copenhagen. The huge and growing populations of poorer countries are crucial factors; an expected world population of 9.1 billion by 2030 and the need for countries such as China and India to develop their economies to lift their people out of poverty were recurrent themes.

The poor will be affected most severely by climate change. Food security is a key issue in global negotiations, and to ignore it risks may lead to serious political instability. Developing countries were critical to the outcomes of COP15; the formulation of the Copenhagen Accord indicated how they can be part of the climate change solution. Governments in many developing nations understand the implications of climate change policy and how it may bring opportunities in agriculture and in mitigation options for offsets in carbon markets. Australia and other more developed countries must be involved as partners with less developed countries to develop and manage global climate initiatives.

An example of the kind of partnership approach that is required is a joint venture between the World Wildlife Fund (WWF) and the Ethiopian Government known as Managing Environmental Resources to Enable Transition (MERET). Through MERET, formerly chronically food-insecure communities are adopting environmentally sustainable use of the natural resources to produce more and better food. Mohamed Hussien's land used to be a gully subject to damaging floods, but through engagement in MERET he has a series of

terraces that grow sorghum⁸. Australian farmers could develop extension relationships, transferring knowledge, research, economic and social support to farmers all over the world to cope with climate variability. This could be managed through our farmers' organisations, which, in conjunction with international farmer's organisations such as the International Federation of Agricultural Producers (IFAP), could develop strategic plans aimed directly at international global food security.

Impact of the GFC

One of the implications of the GFC will be that future private investment in carbon reduction and sequestration projects will be much more heavily scrutinised. As noted earlier, sound environmental management is now a significant corporate objective worldwide. Investment in these areas will be part of a new world order based on Environmental, Social & Governance (ESG) practices. Corporate participation in carbon business opportunities, in particular trading and investment possibilities could create new relationships with agricultural producers and landowners. This creates opportunities for partnerships between the corporate sector and farmers with respect to capital, knowledge transfer and regional development. The difference between carbon and other environmental practices is that emissions performance must be carefully measured and verified to avoid the exploitation which is common in virgin industries. The GFC has given us economic upheaval, but it may have delivered better business structures for the carbon participation and offset sectors.

Figure 3 - Copenhagen IFAP Ag Development Day University of Copenhagen 2009



⁸ Climate, agriculture and food security: A strategy for change p. 26

Chapter 5 – Agricultural Implications

Agriculture should not be included in a legislative ETS; the governments of most countries agree on this issue, as does Australia's. The reasons for the exclusion of agriculture from an ETS are as follows.

Farming businesses are carbon businesses, with two types of inputs:

- Industrialised – energy, fertiliser, fuel, etc.
- Biological – soil, animals, vegetation, water

The former will be hit by increased costs associated with an ETS or carbon tax and should trigger an adaptive process and in many cases create input savings. The major component of the second input category is livestock, and the enteric fermentation that causes methane production is a naturally occurring biological system – this is part of the basic food producing carbon cycle. The Kyoto Protocol does not distinguish sufficiently between GHG emissions from naturally occurring biological processes and industrial and other processes, so the sector requires different accounting rules.

Farmers need to understand the difference between mitigation and adaptation and the different policies that will be required to deliver projects. Farmers can develop carbon returns, make emissions reductions and realise renewable energy opportunities if policymakers respect the differences. Policy makers need to understand at what point we intervene for agricultural production, profit, sustainability, adaptation and mitigation. Will governments facilitate the mechanisms required to differentiate between mitigation and adaptation? To influence this, farmers must participate in the policy process.

Politicians talk more about carbon sequestration in soils than farmers do. Much of the discussion relates to increasing the organic levels of carbon in the soil; this is dependent on many factors including soil type, temperature, existing levels of soil carbon and land practices. The science of measuring and monitoring soil carbon capacity to enable verification associated with carbon trading requires further development, and cannot yet be easily incorporated into day-to-day operations. Soil carbon capacity is not currently recognised in the Kyoto Protocol, for very good reason. Changes in stocks of carbon on deforested land cleared since 1990 are included in Article 3.3 of the Kyoto Protocol and in the

Australian National Accounts, but Article 3.4, which refers to stocks of soil carbon in cropping or grazing land, is not included due to questions over our carbon liabilities with respect to extreme events such as bushfires & droughts. If legislators want to use soil carbon as a commodity, then the measurements must be simplified. The density of soil carbon is important, but current methods of sampling do not recognize roots and other organic matter; this makes quantification slow and tedious.

Farmers' existing management practices in will strongly influence their decisions about providing carbon sinks in their land. Tying up too much land in carbon contracts will reduce flexibility in accommodating seasonal changes. Different practices – cropping systems, fertilizer rates, plant selection, grazing management, irrigation systems – can reduce or increase soil carbon. The key to efficient trade in carbon remains with the legislators, accountants, lawyers and scientists, who must perfect their systems; once this occurs, carbon sequestration has the potential to become a valuable part of farming operations.

Chapter 6 – Barriers for farmers

The climate change hurdles that Australian farmers must jump are complex and increasing in number. The barriers for farmers as I see it include:

1. The uptake and availability of genetically modified (GM) organisms, particularly in the EU. GM crops provide better solutions to coping with climate variability. Their large-scale use will require a shift in consumer and public opinion. The ability to maintain food production levels in a changing climate will rely on this technology.
2. Financial capital required for effective large scale adaptation – this could be raised by a carbon tax which should be redirected straight back into the reducing carbon emissions.
3. Conflicts in policy and over-regulation due to overlapping responsibilities in state and federal government departments need to be resolved.
4. Uncertainty about the time frames and scale of changes required – the rate of new reports being released and their recommendations in an uncertain legislative program is reflective in low carbon prices.
5. Cultural differences between the agriculture and forestry sectors – closer relationships must be developed, particularly at regional levels. Many Australian farmers have very little knowledge of the operations of the forestry industry, and exchanges between agriculture and forestry will be vital to the regional strength of carbon trading.
6. New ways of thinking – Nicholas Stern wrote that “giving up meat is an easy remedy to make ordinary people feel as though they have made a difference”⁹ The reality is less straightforward. Attacking the livestock sector means targeting biological emissions. If farmers move from stock enterprises into cropping, marginal land clearing is exacerbated; it’s important that the complexities of agricultural systems be understood. We expect that the rising middle class demand for protein in Australia’s export markets will encourage the livestock sector to look at emission reductions related to feed inputs rather than ways to mitigate their biological outputs. More

⁹ Nicholas Stern - Stern Report The Economics of Climate Change

research into bovine digestion, more digestively efficient sources of feed and achieving greater sustainability in production systems will help.

Chapter 7 – Actions, Intervention & Opportunities

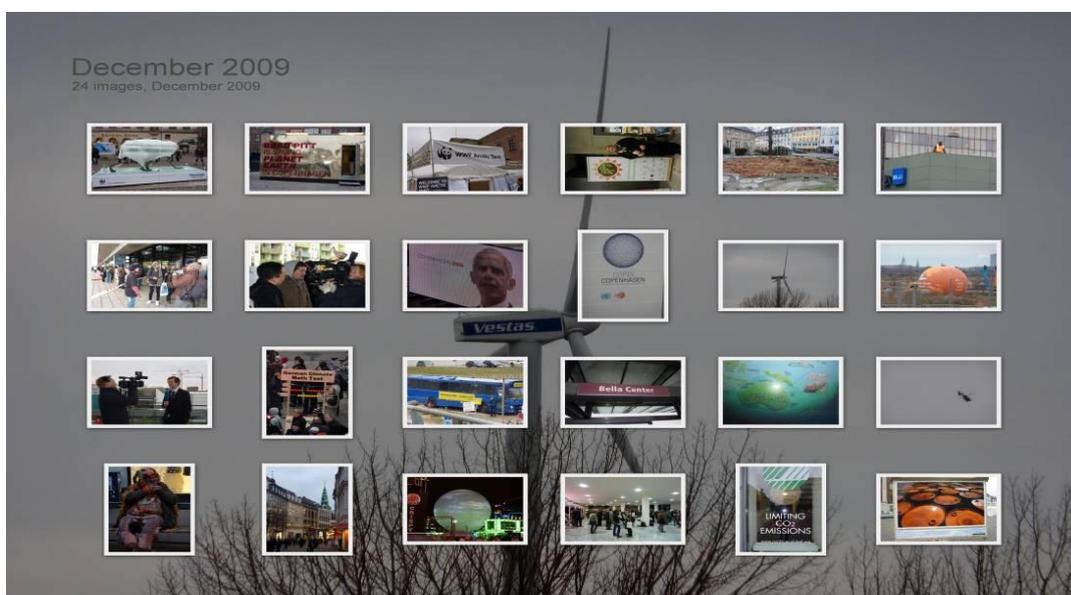
1. Farmers will need Research and Development (R&D) incentives to get involved. Farmers have a natural ability to adapt to climate variability – they do it already – but responses will be enhanced with greater research & development and technology uptake. Agriculture can help limit the damage of climate change, but government funding is to develop the sector’s capacity. Unfortunately, investment in agriculture has decreased worldwide in recent times; a carbon tax could reverse this by redistributing funds back into agricultural research into improving productive capacity in a changing climate.
2. Case studies and farm demonstrations are the best option for knowledge transfer for farmers. As an example, the Ontario Federation of Agriculture runs Carbon Credit Aggregation Producer Consultations¹⁰ to encourage farmers to participate in the climate policy process and ultimately in carbon markets
3. The US and EU use land stewardship programs which incorporate carbon payments, providing returns for farmers and insurance cover for the impacts of extreme events. This approach will strengthen the farm payments issue and the political power of farm organisations in the US and EU. If Australian farmers are slow to embrace the new realities of carbon, our ability to produce within delicate environmental systems will be affected not to mention our competitiveness in world markets.
4. Australian farmers require accurate information to manage the impacts of climate variability so decisions can be made at regional and farm levels; farmers need the skills to make maximum use of climatology services and apply climate data to their decision making.
5. Farmers need a Low Carbon Transition Plan to implement adaptive measures efficiently and quickly. Recent advances in the plant breeding and production field

¹⁰ Carbon Aggregation Workshop for Agriculture Ontario Farmers Federation Guelph 2009

include molecular marker techniques to speed up the breeding process, geographical analysis of vulnerable regions, and regional climate modelling to identify future “tilting points” of rice production. Research of this kind leads to productivity gain and efficiencies in adaptive measures.

6. In the US, a Farmers Union Carbon Credit Program¹¹ involves over 5 million acres with nearly 4000 producers enrolled across 31 states; it has earned nearly \$9.5 million dollars for farmers & rangers since 2006. Eligible practices include: no till crop management, conversion of cropland to grassland, sustainable management of native grasslands, sustainable management of native rangelands, new tree plantings and anaerobic digesters. These types of programs have strongly influenced US climate change legislation. The National Farmers Union (NFU) also supports a national renewable electricity standard as a niche producer; it is hoped that agriculture could supply 20-25% of US energy needs over the next 20 years.
7. The rate of growth in agriculture productivity has slowed worldwide in recent times; less developed regions in Africa and Asia have stagnated. Another Green Revolution is required, bringing together science, technology and indigenous knowledge. Global partnerships with regional focus may provide many of the answers. Working with corporate, family & subsistence farmer’s world wide in extension and research will be important for food security and international emission targets.

Figure 4 – Messages from COP 15 - Copenhagen 2009



¹¹ National Farmers Union www.carboncredit.ndfu.org. Carbon Credit Program

Chapter 8 - Carbon Markets

The fundamentals of carbon markets are:

- **Demand** – carbon emissions from capped business and purchase of offsets
- **Supply** – driven by the quantity of government allowances and the number of offsets available.

Demand varies with emission levels and (as previously mentioned) is dependent upon legislative inclusion in the power, industry transport and energy sectors. The emissions-to-cap-ratio indicates whether a particular country or sector emissions are higher or lower than the cap. A positive ratio indicates the market is short and will increase the price - without a cap there will be no trade. The Marginal Abatement Cost (MAC) is the cost of reducing emissions with one additional unit or tonne of carbon; markets will always respond to the lowest price first, but increasing the demand for emission reductions will raise carbon prices and the emissions costs will escalate. Sole dependence on this process means the emission-to-cap ratio will determine how many reductions or offsets are required. The legislative process of allocating allowances will influence these dynamics and whether they are allocated free or auctioned.

Carbon markets rely upon:

- **Accounting**
- **Monitoring / Auditing**
- **Verification**
- **Registration**
- **Ownership**

Carbon trading rewards the absence of emissions. Fossil driven energy commodities are all carbon-based. Therefore what we really need is to structure the accounting to create sound legal contracts to make sure that renewable energy products send better price signals. The volatility of prices reflects this and this is where the policy can help to stabilise the markets.

The UNFCCC developed the concept of trading carbon offsets; preventing forest destruction keeps CO₂ sequestered in biomass (i.e., the amount that would have been emitted if they had been destroyed), and that carbon offset can be traded. This has been put into practice in two ways: the “pure market” or the “pure fund” approach. Many less developed countries believe that western economies should fund their governments to preserve forests, making them responsible for deforestation rates. This approach would lead to quantifying the CO₂ avoided but would not involve trading of carbon credits for industrialised countries. However, we really need policy that blends both ‘pure markets’ and ‘pure funds’.

Emissions allowances allocated by governments in domestic ETS systems need to be identified as either securities or commodities. The power sectors have already factored it in their business for the future. Whether the allocations are given freely remains a politically driven decision rather than one set by markets or business inputs. The auctioning of permits will ultimately deliver them into a market system.

As new renewable energy technologies emerge, how will they affect the price of carbon? Current voluntary markets have responded slowly to changes in technology. Higher carbon prices require an accelerated rate of technological uptake.

The length of carbon contracts should be no more than 10 years to reflect the current lack of certainty in carbon sequestration methods. Carbon contracts are complicated and tedious to establish, which will increase the dependence on third party facilitation – which may represent a great opportunity, for farm co-operatives and farmers’ organisations rather than individual operators.

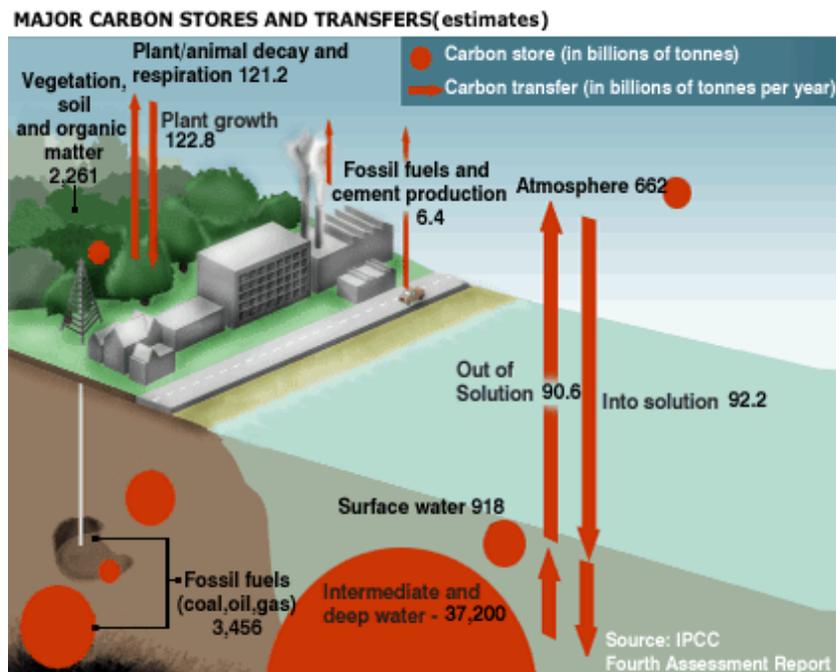
The price of Carbon is volatile and dependent on the success of domestic adoption of cap and trade systems and international agreements on emission targets; little success in these areas in 2009 produced low carbon prices. The GFC slowed global economic growth, which was reflected in lower emission levels and reduced carbon prices, although volumes traded remained high.

Figure 5 - Carbon Trading Workshop Point Carbon Washington DC



Chapter 9 - Offsets and Allowances

Figure 6 - The Carbon Cycle and Transfers



The carbon offsets sector will drive the mitigation of business and ultimately determine the price of carbon. If it's cheaper to buy offsets than to emit pollution, then industry will direct investment appropriately. The issues in the short term are:

1. Will the supply be able to meet demand when legislation and time frames collide?

Accounting rules need to be clear and legally bound. Standards and methodologies need to be understood for compliance to occur. How the energy sectors transition to low emission production and how long governments allocate free allowances will have effects on carbon prices. Climate Change Legislation creates a new assets class via issuing of allowances and these assets will be tradable the supply will not meet the demand early in the markets and therefore offsets will be used in the market place when demand cannot meet supply. There is a provision in the EU – ETS for borrowing allowances when companies can use next years allowances to meet their obligations under the legislation. There is a provision where by

companies can carryover their allowances from one year to another. Similar to the carryover provisions in Australian Water markets (although this is not covered by a cap, it's just individual business operations), how quickly allowances can be banked and that there are no penalties for banking them will be important to consider as it will affect the allowances and therefore the assets' liquidity.

2. Accounting Process in Offsets

Questions that need to be asked are as follows. Does a carbon mitigation project deliver? How is leakage accounted for? Have reductions got the proper methodologies? Would the emission reductions have occurred naturally? What is the permanency of the reductions? Have the reductions been verified, by what standards, and what are the requirements of registration of the offset?

3. Scheme Risks

Many scheme risks relate to ownership and quantification complexities and who are the stakeholders in the process. There needs to be clear establishment of boundaries and definition of who are the:

- Project Owners
- Project Developers
- Project Investors
- Final Buyers

4. Planning for the future

Never sell 100% of carbon credits in one year; this is crucial for new traders to understand. Potential changes in carbon levels or bushfires mean risk management is important. The first 10-20 years of the project provide the maximum sequestration of carbon so there is a need to concentrate the carbon trading enterprise to recognise this. The agricultural sector needs to concentrate its efforts on the best contract periods; future legal obligations associated with carbon sales could be problematic if these legalities are left not clarified by accounting checks.

5. Regulation on its own doesn't always deliver emission reductions; hence the strong trend toward carbon markets and trading. The crucial factor remains the policy frameworks and legislation that will create certainty in the carbon price.

6. *Voluntary carbon markets*

Voluntary markets are used by large corporations as part of their environmental responsibility charters, and they are often looking to participate in programs that capture these images for inclusion in their Annual report. Compliance markets, not voluntary markets, will be the drivers of clarification in accounting rules government legislation will give markets much better signals. Currently carbon market information is not cheap for individuals and small business operators, and quality information and modelling is expensive compliance markets will provide more competition in the carbon service sector as well. Farmers will have to get used to spending money on quality market information which they currently like to get for free in other sectors.

Chapter 10 – It's an Energy Issue, not an Emissions Issue

The carbon issue is really about energy; more precisely, it's about being able to replace our fossil fuels with cheap renewable energy. Reduced burning of fossil fuels will reduce our CO₂ emissions. The technology of soil carbon sequestration through to advanced solar, wind or nuclear power is still in its infancy for agricultural adoption. Should the market drive development or government fund the large-scale implementation of renewable energy technologies via taxation? The research presented in this report suggests a mixture of market and government-driven approaches is needed.

The energy sources that we need to develop include:

- Bio-fuels
- Biomass
- Hydro
- Solar
- Wind
- Marine (wave and tidal energy)
- Nuclear
- Geothermal
- Hydrogen & Fuel cells.

These energy sources are in different stages of development and meet far smaller fractions of total energy demand worldwide than fossil fuels.

Nuclear is the major carbon free sustainable energy source and it's impossible to envision a solution to GHG that does not include it. The Canadian Deuterium Reactor (CANDU)

program has given Canada a head start in what the energy industry calls the “nuclear renaissance”. Canada’s Gen2 reactors were built in the 1970s but are being refurbished to will give them another 30 years of operation¹². Finnish designers are developing Gen 3 pressurised hydrogen reactors, and there is worldwide interest in Gen 4 reactors which are more energy-efficient and fail-safe; these ‘super critical’ water-cooled reactors could generate hydrogen for use in fuel cells for future generations of cars. In China and several other countries, nuclear power plant construction is being driven by a combination of rapidly increasing electricity demand and awareness of the need to reduce air pollution, highlighting the multifaceted environmental management that different countries must embrace. Nuclear power generation is likely to be the world’s primary non-carbon-based energy source until renewable forms of energy generation can compete on price.

Making renewables competitive requires capital and improved technology, but the compliance markets and public opinion about coal-fired power and oil will put pressure on both the private and public sectors to respond. The change-over period will have economic and social costs, but emission reductions must be achieved to arrest climate change. Some data suggest that the economics of renewables are already robust; for example, Danish exports of alternative energy technologies have risen by 19% since 2008.¹³

Coal fired power generation is a complex operation, requiring huge amounts of water (often from purpose-built dams), and the mining, transportation and burning of thousands of tonnes of coal per day. Coal-fired power is also frighteningly inefficient; 30% of the energy value of the coal ends up in electricity and 65% is lost in heat.¹⁴ Such inefficiency does at least mean that there is considerable scope for improved performance via technological innovation. Biomass could be an alternative fuel for the furnaces, although its large-scale use would have implications for agricultural sectors. Over forms of technology must be developed so that electricity generation can continue while renewable power sources are implemented.

¹² World Nuclear Association - www.world-nuclear.org

¹³ Report on Danish Energy. University of Copenhagen Pamphlet 2009

¹⁴ Comments from Supervisor at Shand Power Plant Canada GFP 2009

Figure 7 "Green Power" - Chinese road-side Global Focus Program 2009



Recommendations

1. The issues relating to carbon accounting are complex and must be simplified to reduce the potential for fraud.
2. The focus on emissions targets should be replaced with a focus on the renewable energy sector.
3. Australian farmers need to position themselves to take advantage of carbon payments to offset the costs of adopting environmental best practice.
4. Ease of access to carbon measurement tools and models for small to medium size businesses is essential.
5. The number one priority in next COP round in Mexico is to recognise soil carbon storage as a means of reducing atmospheric carbon. Soil carbon accounting and measuring models need to be simplified to allow farming business management to engage and comply both domestically and internationally.
6. Regional & rural Australian economies have an important role to play in environmental commodity markets and should be allocated resources from carbon taxes to develop their potential. Australian farmers should develop regional marketing networks to create savings in compliance, resource and marketing their carbon as well as utilisation for adaptive advantages, and to build the capacity, extension and R&D required to drive regional growth in carbon markets.
7. Regional development and the farming sector are well placed to be big winners in the new 'green' economy. Agricultural and environmental jobs need to be targeted aggressively and early in the introduction of climate change policy.
8. A domestic carbon tax, with revenue isolated from general tax revenue and used to redistribute capital into technology, research and development of carbon infrastructure mitigation projects, could drive a rapid response to climate change and make Australia less reliant on international developments.

9. Increase the development of third party facilitation through the existing farm service sector, preferably with regional boundaries – creating the ‘bio-regions’ concept in offset delivery.
10. As environmental commodities become more defined by markets and price sensitivity, we need to redefine our relationships with the other stakeholders; agriculture should forge relationships with environmental groups.

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Plain English Compendium Summary

Project Title: Carbon – the New Diamond for Australian Agriculture	
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Scholar:	Jennifer Hawkins
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Objectives	To study Climate Change Policy, Carbon Accounting and its implications for Australian farmers.
Background	Carbon Accounting remained a stepping stone into a Nuffield study that went on to include carbon policy and the renewable energy sector and international carbon policy as well. The fact that the sector is in its infancy means that this study is just the introduction. Australian Agriculture and the individual farmers must participate in the formulation of carbon policy and the development of carbon markets as their industry and regions will be affected by the introduction of a carbon price.
Research	A Carbon Accounting Short Course at Swinburne University and a Carbon Trading Workshop (Advanced) in Washington DC with Point Carbon. Six weeks Global Focus Program visiting China, Philippines, Mississippi, Washington DC, Canada, France & Ireland. Then an individual study tour in which I visited government, industry and farming regions & cities in Washington DC , New York, Canada, UK, Copenhagen , Rome and Japan.
Outcomes	<ul style="list-style-type: none"> • Regional & Rural economies have a huge potential in carbon industry • Capital is required to be redistributed directly back into the sector to be able to achieve environmental outcomes • Australian farmer’s need to position themselves and their local economies to be leaders in the carbon sector • Relationships with all environmental groups, energy sectors and governments will be pivotal for the agricultural sector to achieve best policy position. • Carbon accounting is still complex and difficult to adopt for small business. Work needs to be done at domestic and international levels to sanction carbon verification, compliance and fraud. • Recognizing soil carbon needs to be number one priority in the international discussions.
Implications	The Australian economy will be impacted by a carbon price the agricultural sector has a huge role to play in the development of carbon storage and renewable energy sector. This transition period will have big financial costs that must be driven by the revenue raised in a carbon price. Regional development and the new “green “economy should geographically advantage rural economies. Environmental commodities internationally seem to be driven by markets but the role of governments is still vital. Carbon accounting needs to become simple, relevant to regions and non compliance or fraud issues need to be clear and prosecutable. Climate change policy requires simple language for sectorial participation and uptake. The ability of farmers to adapt will be a natural response as climate becomes more variable. The key to unlocking the adaptive potential come with Research & Development and technology uptake.