National Farmers' Federation

Submission in response to the 2017 Review of Climate Change Policies Discussion Paper

5 May 2017

NFF Member Organisations

AGFORCE

Australian Chicken Growers' Council Ltd

Australian Dairy Farmers

AUSTRALIAN FOREST PRODUCTS ASSOCIATION
afpa
TREES | WOOD | PAPER

Australian Livestock Exporters' Council
ALEC

ALPA

AUSTRALIAN Pork

AUSTRALIAN VETERINARY ASSOCIATION

PURE BEECHWORTH HONEY
100% Pure Australian Honey

CANEGROWERS

CATTLE COUNCIL OF AUSTRALIA

CORPORATE AGRICULTURAL GROUP

COTTON AUSTRALIA

driedfruits australia

FCA
FARMERS FOR CLIMATE ACTION

Future Farmers Network

Goat Industry Council of Australia inc.

GrainCorp

Grain Growers
Real benefits. Real results.

NORTHERN TERRITORY CATTLEMEN'S ASSOC. N.T.C.A.

nsw FARMERS

NEW SOUTH WALES IRRIGATORS' COUNCIL

The Pastoralists' Association of West Darling

PET
Primary Employers Tasmania

RICEGROWERS' ASSOCIATION OF AUSTRALIA INC

SHEEPMEAT COUNCIL OF AUSTRALIA

Summerfruit AUSTRALIA

WAFARMERS

Victorian Farmers Federation

WOOLPRODUCERS AUSTRALIA

The National Farmers' Federation (NFF) is the voice of Australian farmers.

The NFF was established in 1979 as the national peak body representing farmers and more broadly, agriculture across Australia. The NFF's membership comprises all of Australia's major agricultural commodities across the breadth and the length of the supply chain.

Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations form the NFF.

The NFF represents Australian agriculture on national and foreign policy issues including workplace relations, trade and natural resource management. Our members complement this work through the delivery of direct 'grass roots' member services as well as state-based policy and commodity-specific interests.

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Statistics on Australian Agriculture

Australian agriculture makes an important contribution to Australia's social, economic and environmental fabric.

Social >

There are approximately 150,000 farm businesses in Australia, 99 per cent of which are Australian family owned and operated.

Each Australian farmer produces enough food to feed 600 people, 150 at home and 450 overseas. Australian farms produce around 93 per cent of the total volume of food consumed in Australia.

Economic >

The agricultural sector, at farm-gate, contributes 2.4 per cent to Australia's total Gross Domestic Product (GDP). The gross value of Australian farm production in 2016-17 is forecast at $58.5 billion – a 12 per cent increase from the previous financial year.

The majority of the 150,000 farm businesses in Australia are small businesses, with 96% having a turnover of $2 million or less.

Together with vital value-adding processes for food and fibre after it leaves the farm, along with the value of farm input activities, agriculture's contribution to GDP averages out at around 12 per cent (over $155 billion).

Workplace >

The agriculture, forestry and fishing sector employs approximately 323,000 employees, including owner managers (174,800) and non-managerial employees (148,300).

Seasonal conditions affect the sector's capacity to employ. Permanent employment is the main form of employment in the sector, but more than 40 per cent of the employed workforce is casual.

More than 50 per cent of farm businesses have no employees at all.

Environmental >

Australian farmers are environmental stewards, owning, managing and caring for 52 per cent of Australia's land mass. Farmers are at the frontline of delivering environmental outcomes on behalf of the Australian community, with 94 per cent of Australian farmers actively undertaking natural resource management.

The NFF was a founding partner of the Landcare movement, which recently celebrated its 25th anniversary.

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The National Farmers' Federation (NFF) welcomes the opportunity to contribute to the 2017 Review of Climate Change Policies being conducted by the Department of Environment and Energy.

The NFF recognises that climate change poses a significant challenge for Australian farmers. As a nation, we must act to ensure that our economy is well placed to cost efficiently reduce our national greenhouse gas emissions profile.

In NFF's view it is critical that the suite of Government policies that seek to address the challenge of climate change are fully examined, to ensure that the policy levers of Government work cohesively to achieve our national objectives while minimising the risk of unintended or perverse outcomes. NFF supports a "policy toolkit" approach, whereby the most efficient and sector appropriate policy mechanisms are implemented.

The agriculture sector contributes to our national emissions profile by both sequestering carbon in soils and vegetation and by emitting of carbon, methane and nitrous oxides from farming practices such as livestock production, cropping practices, the use of fertilisers and the burning of savanna grasslands.

In this submission, we outline the policy settings that will enable the agriculture sector to contribute to our national emissions reduction task, to maintain our international competitiveness and to allow us to reach our potential of a $100 billion industry by 2030. To achieve these three objectives, national climate policies should:

- Be stable to facilitate the necessary long term investments in power generation for the national electricity market. Government policies must not favour specific technologies, but rather enable technologies to compete on their merits. In NFF's view, some form of market-based climate policy for electricity generation will provide the lowest cost pathway to reduce emissions from electricity generation.

- Incentivise energy productivity on farm by providing grants or rebates for on-farm energy efficiency audits, rebates for capital upgrades, or taxation provisions for the accelerated depreciation of energy efficient equipment.

- Recognise and reward, rather than penalise, farmers for sequestering carbon in native vegetation – and, at the same time, reward them for delivering biodiversity and other environmental services to the Australian community.

- Unlock the full carbon potential of Australian farms by improving the design of carbon offset markets to make them more accessible and more attractive for farmers.

- Encourage investment in agriculture research, development and extension of climate smart practices and technologies that concurrently reduce emissions and improve productivity and profitability. These will be adopted by farmers as it makes business sense to do so.

The importance of stable, scalable and cohesive climate policy settings should not be understated. To achieve this, NFF's view is that emissions reduction policies must be coordinated nationally to avoid economically inefficient distortions, and to ensure our competitiveness in global markets is enhanced and not undermined.

This review has adopted a sector by sector approach in its initial consultative stages. NFF seeks that, in the next stage of this review, government undertake the comprehensive economic and emissions reduction modelling that is required to support a robust national policy debate on the most efficient and effective long term policies for our economy as a whole.

NFF looks forward to further opportunities to provide input into the review.

1. Introduction

The National Farmers' Federation (NFF) welcomes the opportunity to contribute to the 2017 Review of Climate Change Policies that is being conducted by the Department of Environment and Energy.

The NFF recognises that climate change poses a significant challenge for Australian farmers. As a nation, we must act to ensure that our economy is well placed to cost efficiently reduce our national greenhouse gas emissions profile.

Australia's farm sector is on track for its best-ever results, with agricultural production forecast to tally a record $63.8 billion in 2016–2017[1]. NFF's vision for Australian agriculture is to become a $100 billion industry by 2030. The sector is a source of strength in the Australian economy, and is well positioned to capitalise on growing global demand for safe and high quality food and fibre over coming decades.

More than 75% of Australian agriculture produce is exported. Thus being a sector that is very exposed to international markets, agriculture needs to remain globally competitive. It is crucial that climate policy settings recognise the importance of maintaining our competitive position in global markets. As a key pillar – and a stabilising pillar - in Australia's economy, there is a national economic imperative to ensure that climate policies support a sustainable and growing agriculture sector.

It is critical that the suite of Government policies that seek to address the challenge of climate change are fully examined to ensure that the policy levers of Government work cohesively to achieve our national objectives while minimising the risk of unintended or perverse outcomes. NFF supports a "policy toolkit" approach whereby the most efficient and sector appropriate policy mechanisms are implemented. This review has adopted a sector by sector approach in its initial consultative stages. NFF seeks that, in the next stage of this review, government undertake the comprehensive economic and emissions reduction modelling that is required to support a robust national policy debate on the most efficient and effective long term policies for our economy as a whole.

Australian agriculture has always operated in a varied and challenging climate. What we now know from the scientific community is that we face a rate of change much faster than was previously expected[2]. The continued success of the agriculture sector will depend on our ability to continue to innovate and adapt to best manage future climatic risks.

Coupled with the biophysical challenge of a changing climate, the agriculture sector is facing changes in market requirements. Increasingly we will need to meet stakeholder expectations to demonstrate how climate risk is factored into our business decisions so that, in turn, our investors and buyers can demonstrate they are actively managing climate risk. The challenge

[1] ABARES 2017, Agricultural commodities: March quarter 2017. CC BY 3.0.

[2] See for example 2016 State of the Climate Report produced by CSIRO and the Bureau of Meteorology.

of adaptation cannot be underestimated, and a continued focus on the information, research and innovation agenda for adaptation is essential.

Consistent with the framing of the Discussion Paper, NFF has adopted a narrow view of climate policy for this submission. We focus on the mitigation or emissions reduction challenge to meet our 2030 target to reduce emission by 26-28%, and any future targets that may be set as governments around the world revise targets to meet the well below 2°C ambition of the Paris Agreement.

The agriculture sector contributes to our national emissions profile by both sequestering carbon in soils and vegetation and the emission of carbon, nitrous oxides and methane from farming practices such as livestock production, cropping practices, the use of fertilisers and the burning of savanna grasslands. Combined, methane and nitrous oxide emissions account for about 14% of Australia's National Greenhouse Gas Inventory.

The Agriculture sector's "share" of the national inventory is effectively reduced by the role that farmers, as managers of approximately 60% of Australia's landmass, play in the sequestration of carbon in soil and vegetation. Reductions in land clearing, imposed on land managers by State Government regulation, have been the biggest sectoral contributor to emissions reductions in Australia since 1990, with net emissions declining by 85 per cent from 1990 to 2012.

There is great opportunity for Australian agriculture to contribute to our national emissions reduction goals. This opportunity requires innovation to reduce the emissions intensity of our production systems and the policy and regulatory settings that enable farmers to efficiently participate in carbon markets.

This submission explores in more detail the specific policy mechanisms that are, in our view, appropriate and cost efficient for our sector, and where more work needs to be done. These measures would enable the sector to contribute to our emissions reduction task while maintaining our international competitiveness.

2. Australia's Paris target

The world's population is forecast to exceed 9 billion people by 2050, and demand for food and fibre is on track to increase by 60 per cent in that timeframe. Meeting this demand in the context of a changing climate, while also contributing to global action to reduce emissions, is a challenge for global agriculture.

In December 2015, 197 countries, including Australia, under the banner of the United Nations Framework Convention, negotiated the "Paris Agreement" which aims to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and to increase the ability to adapt to climate change. Specifically, the Australian Government committed to implementing an economy wide target to reduce greenhouse gas emissions by 26 to 28 per cent below 2005 levels by 2030. 144 nations, including Australia, have now ratified the agreement.

A commitment to five-yearly reviews of national emissions reduction targets are an integral component of the Paris Agreement. In conducting these reviews, it will be important for the Government to examine the:

- targets and progress of our key competitors in international markets, to ensure that Australian trade exposed industries are not placed at an unfair disadvantage;
- suite of policies that are in place, to ascertain whether they are working effectively and efficiently towards achieve our targets;
- distribution of impacts (both positive and negative) of policies, whether these align with anticipated impacts, and any unintended consequences of policies;
- effectiveness of initiatives designed to mitigate negative impacts; for example, impacts on trade exposed industries or vulnerable households; and
- benefits to the economy of setting longer-term emissions reduction targets, to provide a basis for policy stability and investment certainty.

3. Electricity generation

The NFF recognises that Australia's generation mix needs to change as existing infrastructure assets reach the end of their useful lives and to meet emissions reduction targets.

The entire Australian community relies on secure, affordable access to electricity and other forms of energy, and the Australian agriculture sector is no different. The current regulatory regime is not serving the interests of consumers, and this is particularly the case for Australian farmers. Affordable and reliable electricity is essential to ensure that Australian agriculture and downstream value adding sectors remain internationally competitive.

The failure of the NEM to meet consumer needs has been driven by a combination of climate policy uncertainty, and a National Electricity Market regulatory regime that has been designed for centralised, largely coal-fire powered generation. A coordinated national strategy for emissions reduction and electricity market reform is necessary to provide certainty and to ensure access to affordable and reliable sources of electricity. The energy generation sector needs to be capable of meeting both current and future emissions reduction obligations at the lowest cost.

The current suite of Federal, State and Territory climate policies are distorting and compromise the entire NEM, hampering a smooth transition and driving inefficient investment. Under the current settings, the Renewable Energy Target (RET) distorts the generation sector through opaque cross-subsidies from consumers and non-renewable generators to renewable generators. The RET was designed as a transition policy, but has by default become the core policy lever to reduce emissions in the electricity sector by favouring particular types of generation technology. This distortion is further compounded by government investments in specific technologies through the Australian Renewable Energy Agency and the Clean Energy Finance Corporation.

The 2020 RET has been legislated by and enjoys the bipartisan support of the Commonwealth Parliament. NFF recognises that retention of the RET provides certainty to investors in renewable energy as we transition to a more comprehensive policy framework. But this should not be used as an excuse for not transitioning to a more efficient and cost-effective market-based mechanism by 2020.

Government policy must not favour specific technologies but rather enable the technologies to compete on their merits. NFF recognises the need for a smooth transition to a market based system and holds the view that Australia must move from a policy environment layered in policy distortions and subsidies to one that is market-based. Based on current evidence, the NFF believes the lowest cost pathway to a low emissions future is some form of market-based approach for electricity generation.

NFF strongly supports research into, development and adoption of new generation and storage technologies, including both centralised and decentralised generation. Innovation will continue to drive change in the way that electricity is generated and managed to meet end-user requirements. Further research is also required to enable the flexibility to support a greater role for decentralised generation and smaller scale or micro-grids.

Reform is also required to maximise the opportunity provided by investments made in small-scale decentralised generation, such as that which occurs on Australian farms. With the emergence of new technologies, generation capacity is becoming increasingly decentralised, which is a significant disruption to the NEM model. Examples of this include solar or biogas facilities on farms, and the co-generation capacity of meat processing facilities and sugar mills. For example, dairy farmers are already embracing renewable energy technologies, with 44% of surveyed farms in 2015[3] having installed some form of renewable energy installation such as heat pumps (15%), solar water heating (15%) and solar PV panels (24%).

The drivers for increased uptake are many and varied, but the falling price of technologies, and consumer response to spiralling costs from the NEM, mean more and more farmers are seeking to go off-grid. There are currently barriers to enabling the excess electricity generated by solar, biogas or biofuels to be fully utilised. The regulatory settings are such that there is no incentive for large-scale electricity networks to accommodate, let alone encourage, maximising the value from investment in distributed generation.

Many commentators, including most recently the Preliminary Report on the Future Security of the National Electricity Market by the Chief Scientist Dr Alan Finkel, have highlighted the importance of policy stability and predictability, which is necessary to ensure that investors have confidence to build the assets that will deliver the required security and reliability of the electricity supply.

NFF's view is that emissions reduction policies must be coordinated nationally to ensure that electricity is reliable and affordable so that the international competitiveness of farmers and the agricultural value chain is not undermined. A do nothing approach is untenable, and an enduring policy framework is required to provide the electricity sector with certainty for investment. A market-based approach for the electricity generation sector that has the broad

[3] See Watson P and Watson D (2015) Dairy Australia Sustainability Framework Survey http://www.dairyingfortomorrow.com.au/wp-content/uploads/Australian-Dairy-Sustainability-Framework-NRM-Survey-2015.pdf p 50

scale support from the community, industry and the Parliament would provide a platform for stable and low cost transition to low emissions generation.

KEY MESSAGE – Policy stability is crucial for future investment in our electricity market. Government climate policy must not favour specific technologies but rather enable the technologies to compete on their merits. Based on current evidence, the NFF believes the lowest cost pathway to a low emissions future is some form of market-based approach for electricity generation.

KEY MESSAGE – Policy reform is required to harness the opportunity that is provided by decentralised generation facilities on farms and in the supply chain.

4. Households, small to medium-sized enterprises and the built environment

The majority of the 150,000 farm businesses in Australia are small businesses, with 96% having a turnover of $2 million or less. As highlighted by Energetics Analysis for the Department of the Environment, abatement through energy productivity could account for approximately 44% of total abatement potential[4]. There is significant opportunity for improving energy productivity on Australian farms.

With the support of the Australian Government[5] and other partners, a number of agricultural industries have led initiatives designed to identify and promote opportunities to promote energy productivity on farm. Examples of these initiatives include:

- NSW Farmers' Farm Energy Innovation program which developed information, case studies, tools and calculators[6].
- In the cotton industry, detailed energy use efficiency information, case studies and audits have been prepared[7], and the myBMP Program has a specific "Energy and Input Efficiency" module[8].
- Funded by the Queensland Government, and in partnership with Ergon Energy, Queensland Farmers' Federation is delivering the Energy Savers Program, designed to

[4] Energetics (2016) *Modelling and analysis of Australia's abatement opportunities.* Report to the Department of the Environment. http://www.environment.gov.au/system/files/resources/b8540c8a-8a31-4aba-a8b5-63cc46466e33/files/modelling-and-analysis-australias-2030-abatement-opportunities.pdf p iv

[5] The Department of Industry and Science Energy Efficiency Information Grants Program (EEIG).

[6] http://www.aginnovators.org.au/project/farm-energy-innovation-program-eeig

[7] http://www.cottoninfo.com.au/energy-use-efficiency

[8] See https://www.mybmp.com.au/user/modules.aspx?id=AE641B48-3E9D-4E25-BD58-C7BCE166DC65&p_id=5256D01B-CD90-4F19-A799-0FE9FF441F5A

assist farmers reduce energy costs by supporting the accelerated adoption of improvements in on-farm energy use[9].

- Dairy Australia's project 'Smarter energy use on Australian dairy farms', aimed to help dairy farmers use energy more efficiently. Between 2012 and 2015, the project provided 1400 dairy farmers with detailed energy assessments[10]

These initiatives provide a sound evidence base to further promote energy efficiency and productivity on farm. As a result of audits and combined with escalating power prices, options to improve energy efficiency that have low capital outlays and short pay back periods are being adopted by farmers. For some options, large up-front capital costs for equipment upgrades with longer pay back periods hamper efforts to improving energy efficiency.

For example, analysis commissioned by Dairy Australia[11] examined the opportunities for improved energy efficiency on a total of 109 dairy farms across all states and the associated potential $/t$CO_2$-e cost for emissions savings. The review identified that the projects most likely to be attractive to dairy farmers without any external funding incentives are those projects with a payback period less than five years. It found, for example, heat recovery units could be installed at 58 of the 101 mainland farms, with an average three-year payback and total savings of 919 tonnes of CO2-e per year.

The analysis also considered the difference if farmers could access incentives up to 50% of project costs to a maximum of $5000. It showed that heat recovery units became an attractive project for 89 of the 101 farms. Incentives reduced average payback to 2.7 years and generated total emissions savings of 1210t/CO_2-e per year (or ~13t per farm). The total cost of the government contribution would be $385,500, translating to $21 tonnes CO_2-e saved.

While the carbon abatement per project on each farm seems small, Australia has approximately 6000 dairy farms. If 20% of farms installed heat recovery units, the annual carbon savings collectively would be approximately 16,640 tonnes per year or more than 2% of total dairy farm energy-related emissions.

In NFF's view, there is an opportunity for the Government to consider policies that would support improved energy efficiency on farms. Currently, the Clean Energy Finance Corporation supports commercial lenders to offer lower interest rate loans for energy efficient equipment and renewable energy technologies for small businesses. Similarly, a number of State Government programs exist that provide low interest loan facilities[12].

In addition to these opportunities, consideration should be given to other policy options that incentivise energy productivity such as grants or rebates for on-farm energy efficiency audits,

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[9] http://www.qff.org.au/projects/energy-savers/

[10] http://frds.dairyaustralia.com.au/events/smarter-energy-use/

[11] Dairy Australia, 2014. http://www.dairyaustralia.com.au/Environment-and-resources/Energy-costs.aspx

[12] See for example the QRAA Primary Producer Sustainability Loans http://www.qraa.qld.gov.au/current-programs/Productivity-Loans/sustainability-loan; NSW Rural Assistance Authority Farm Innovation Fund http://www.raa.nsw.gov.au/assistance/farm-innovation-fund

rebates for capital upgrades or taxation provisions that enable the accelerated depreciation of energy efficient equipment.

These policy options need to be supported by the right expertise so that farmers have confidence in auditing processes and are provided with relevant, reliable and cost effective strategies to change practice in a way that suits their business. Technical advisers need to understand farming operations so that they can recommended options that are compatible with day-to-day operations. Past industry experience in program delivery has highlighted that, where experienced personnel have not been available, the value of investment in audits and other extension activities has not been fully realised.

NFF recommends that any future Commonwealth policy seeks to build on and leverage the significant base provided both by industry-led initiatives and those that are being implemented by state and territory jurisdictions.

KEY MESSAGE – Incentivising energy productivity is a significant opportunity for low cost abatement. Past investments in exploring energy productivity on farms provide a significant platform of knowledge to promote further efficiency improvements.

5. Land and agriculture

5.1 – The challenge to meet growing global food and fibre demand

A key challenge in shaping climate policy settings is the need to reconcile the competing objectives of food and fibre security for a growing global population while also reducing the emissions from the sector. This challenge is reflected in the text of the Paris Agreement.

The Preamble to the Paris Agreement recognises the need to safeguard food security and, in Article 2, the agreement acknowledges the need to adapt to the adverse impacts of climate change, and foster resilience and low greenhouse gas development in a manner that doesn't threaten food production.

The global population is growing – and it is becoming more affluent, bringing with it a change in diet. Global agriculture needs to grow to meet this demand, but we need to do this in a way where we produce more food with less emissions.

It is NFF's view that climate policy, as it relates to the agriculture sector, must be based on an emissions intensity approach. This form of metric supports growth in global agricultural production to meet global food and fibre demand and supports sustainable farm businesses while still enabling farmers to contribute to emissions reduction efforts.

KEY MESSAGE – A focus on emissions intensity supports growth in global agricultural production to meet growing global food and fibre demand, while still contributing to emissions reduction efforts.

5.2 - Overview of the suite of policy options for the agriculture sector

Australia's emissions reduction policies must recognise the difference between the variability associated with the natural carbon cycle of agricultural systems and emissions that result from fossil fuel use and other industrial activities.

The Climate Change Authority (CCA), as part of its Special Review of Australia's Climate Goals and Policies, recommended that carbon market crediting and the pursuit of low emissions technologies were the most appropriate policy responses for the agriculture sector. The CCA highlighted that there are a number of policy tools that are not suited for the farm sector, including mandatory coverage of agriculture in a cap and trade or similar scheme and direct regulation.

In relation to mandatory coverage of agriculture in a trading scheme, the CCA concluded that:

> *"A market mechanism like an emissions intensity scheme or a cap and trade scheme is not well suited to the land sector because it would carry high transaction costs…. Estimation techniques to verify emissions reductions can also be complex in some cases. This means land holders tend to have relatively high transaction costs to reduce emissions, which makes mandatory coverage by a market mechanism problematic.."*[13]

In relation to direct regulation, the CCA concluded that:

> *In most cases regulation would not be expected to work well in the land sector because farm and forestry businesses are very diverse in the activities they undertake, the natural conditions within which they operate and in their scale. This diversity makes it very difficult to design cost-effective regulations*[14].

NFF supports the CCA's findings. Unlike most businesses in other sectors of the economy, farms are integrated into the natural carbon cycle. This makes measuring, verifying and managing emissions problematic. Furthermore, the farm sector has limited commercially-viable abatement options for reducing net emissions. For example, whole farms systems research conducted by the Primary Industries Challenge Centre[15] concluded that that there is still a distinct lack of clear options to profitably reduce net emissions in livestock (dairy, beef and sheep) farming systems in southern Australia. This means that coverage in a mandatory cap and trade scheme would mean that the only way a farmer could meet a liability would be to reduce production, significantly reducing the sectors international competitiveness.

KEY MESSAGE –Policies such as mandatory coverage in trading schemes or direct regulation do not suit the agriculture sector. Policies that encourage innovation and adoption of low emissions technologies and participation in carbon offset markets are most appropriate for agriculture.

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[13] Climate Change Authority (2016) *Towards a climate policy toolkit: Special Review of Australia's climate goals and policies* P 130-131

[14] Climate Change Authority (2016) *Towards a climate policy toolkit: Special Review of Australia's climate goals and policies* P 131

[15] PICCC is a collaborative venture University of Melbourne and Agriculture Victoria http://www.piccc.org.au/WFSAM

The sections below explore the opportunities and challenges associated with the design of policy settings that best suit the agriculture sector.

5.3 – Offset markets such as the Emissions Reduction Fund

Many policy commentators and academics continue to point to the "land sector" and agriculture as a key source of offsets, both under current policies such as the Emissions Reduction Fund and any future voluntary or mandatory offset market. For example, Energetics[16] analysis for the Department of the Environment and Energy identified that changes in land management (predominantly reafforestation or avoided deforestation) and low emissions farming practices were comparatively low cost abatement options, with an abatement potential of 359.1 Mt CO_2-e by 2030. The demand for genuine abatement is likely to continue to rise as governments continue to reset targets to meet the ambition of the Paris Agreement.

It is critical that Government ensures that the settings of offset markets facilitate efficient participation by farmers. NFF has long argued that there are fundamental barriers to farmers participating in the carbon market, including:

- There is no easy way for a farmer to bundle up and sell all the different sequestration and emission reduction strategies that suit their farm system and business model. This creates very high administrative costs and reduces efficiency.
- There are a very limited number of methods available that are relevant to the majority of farmers. The reality is that for most Australian farmers cost-effective methods are not yet available.
- Understanding the legal and financial risks to participating in the carbon market is difficult, and sourcing trusted and independent advice is challenging. Emissions reduction projects are long term commitments of at least 7 years, and in the case of sequestration projects 25 or 100 years.

Despite some adjustments on the establishment of the Emissions Reduction Fund, it is NFF's view that these barriers to an effective and efficient offset market persist. With the ERF now five auctions old, these barriers to participation are increasingly evident. Vegetation projects (reafforestation and avoided clearing) continue to be awarded the vast majority of contracts with 122 million tonnes of abatement contracted across 227 projects nationwide. Of the agriculture methods available only two methods have been used – methane utilisation in piggeries and soil carbon sequestrating in grazing systems, for a grand total of 21 projects and a total of 17.7 million tonnes of CO_2 abatement. Similarly, only 13.8 million tonnes of abatement have been achieved by savannah burning methods utilised in northern Australia.

[16] Energetics (2016) Modelling and analysis of Australia's abatement opportunities Report to the Department of the Environment http://www.environment.gov.au/system/files/resources/b8540c8a-8a31-4aba-a8b5-63cc46466e33/files/modelling-and-analysis-australias-2030-abatement-opportunities.pdf

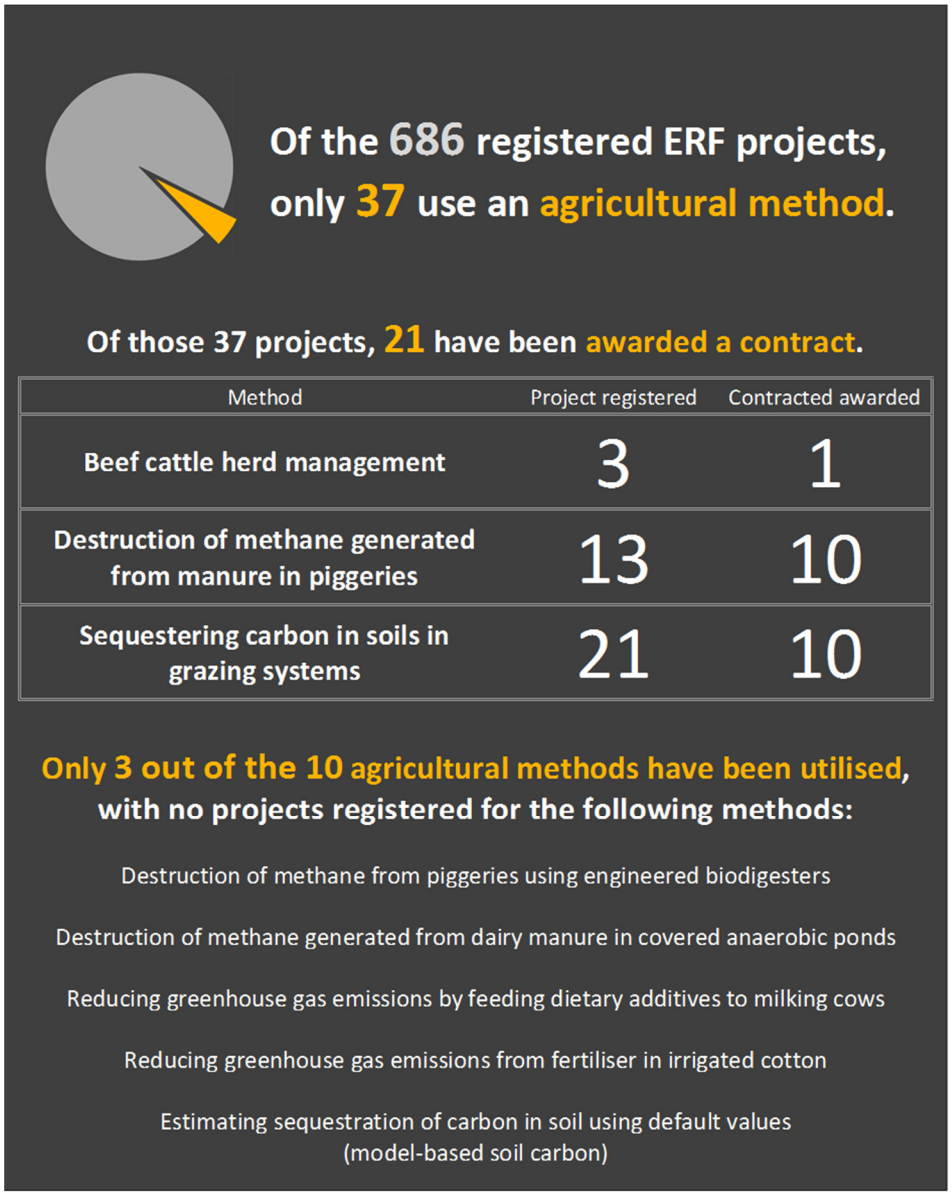

Figure 1 Breakdown of ERF projects utilising agricultural methods after the fifth ERF auction, April 2017.[17]

The question stands as to why farmers have not taken up the other approved methods that would enable them to participate in the ERF. These include livestock and production management methods to reduce methane from dairies, those to reduce emissions from cattle by adding nitrates to feeds and those that reduce emissions of nitrous oxides from fertiliser use in cotton farming systems. These methods are simply not cost effective to implement. The cost of implementing the practice outweighs the benefit of offset market income.

[17] NFF analysis using data sourced from the Emissions Reduction Fund project register http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register

With the exception of very large industrial businesses, approved methods are single activity methods. For a farmer to apply more than one method, they would be required to implement multiple carbon projects, each with their own partners, monitoring and reporting rules.

Analysis conducted by FSA Consulting, RAMP Carbon and Charles Darwin University[18] of ERF opportunities on a livestock property showed that the overhead costs for running projects using available methods were:

- Cattle herd management projects: approximately $100,000 over 7 years
- Avoided clearing / managed regrowth projects: approximately $150,000 over 25 years
- Savanna fire management: approximately $200,000 over 25 years

The overhead costs included the costs of initial project registration (including legal fees, mapping, preparation of required documentation etc), ongoing monitoring and data collection and the preparation of project reports and management of audits. The same report demonstrated the scale at which ERF projects become viable. For example, adoption of the nitrates method just breaks even for 30,000 breeding cows, but runs at a significant loss for 10,000 cows. The study concluded that the nitrates method will be only feasible for large aggregations of supplemented animals[19].

Another example is the examination by the cotton industry of the costs and benefits of adopting the cotton fertiliser efficiency method. Case study analysis showed that participation by ten "average sized" cotton farms would be required to meet the current minimum bid threshold of 2,000t of CO_2-e equivalent per year. The case study model applied the method in a way that does not risk decrease in yields. Using average ERF auction prices and including the costs associated with participating in an aggregated project, there is no financial return, and a carbon price of $10/tonne resulted in negative returns. This is due largely to the high administration and auditing costs associated with implementing the approved method[20].

Analysis by the dairy industry on the approved method for capturing methane from dairies from anaerobic ponds has shown that for almost all dairy farmers, the scale of their operations means that investment in the technology is just not viable. This, combined with

[18] SG Wiedemann, MA Telfer, P Cohn, J. Russell-Smith (2015) *ERF Opportunity Study,* report prepared for Meat and Livestock Australia pg 88

[19] SG Wiedemann, MA Telfer, P Cohn, J. Russell-Smith (2015) *ERF Opportunity Study,* report prepared for Meat and Livestock Australia Pg 89

[20] For more information see http://www.cottoninfo.com.au/sites/default/files/documents/ERF%20fact%20sheet%20-%20nitrogen%20%28updated%20May%202016%29.pdf

the cost of project administration and reporting, means that there is insufficient financial incentive to participate[21].

As highlighted in Figure 1, pork producers have been active participants in the ERF and its predecessor the Carbon Farming Initiative. Australian Pork Limited (APL) estimates that 13 per cent of Australian pork comes from farms with biogas systems. In these instances, participation in an ERF projects have been commercially viable. The revenue from the sale of ACCUs, combined with revenue from the sale of renewable energy and the avoided costs of sourcing electricity from the grid, has provided sufficient financial incentive to install methane biogas systems. APL estimates that biogas generation is currently economically feasible opportunity for large piggeries (greater than 500 sows); however, the ability for smaller sized producers to participate in the ERF remains questionable as the capital investment required to establish the system to run a biogas project is not matched by returns[22].

Individually, most of Australia's 150,000 farm businesses are small low value carbon projects that cannot sustain the overhead costs associated with participating in the ERF in its current form. The overhead costs of projects and the financial risks (such as reduced productivity) of implementing a method often far outweigh the financial benefits of the carbon price, and, therefore, we see a number of methods barely or not even utilised. With the average ERF Auction price down to $11.83 / tonne CO_2-e, the competitiveness of projects beyond large scale vegetation management is increasingly limited.

The method by method model also presents an overly cumbersome and expensive process for what may be a relatively straight forward and "adoptable" suite of on-farm management practices. A typical mixed farming enterprise may have opportunities to restore vegetation, agroforestry, increase soil carbon, avoid methane and N_2O emissions and increase energy efficiency, but as yet there is no easy way to bundle up these small parcels and sell them in a way that is efficient.

For small farm businesses, the effort required for a single method offset project is just not worth it as the current approach to participating means that a significant percentage of project value is lost to overheads, and this is significant barrier to uptake. Analysis from the University of Melbourne's Primary Industries Climate Challenges Centre (PICCC) indicates that "carbon" is likely to contribute less than 1% of average farm income. This, factored with a risky market interface with complex agreements with service providers and aggregators to meet minimum bid sizes, means that for many farmers, "farming carbon" is not an appealing enterprise choice.

Some mitigation technologies will naturally lend themselves to carbon aggregation by farm input suppliers. Fertiliser technologies that reduce nitrous oxide emissions and feed additives

[21] For more information see http://www.dairyclimatetoolkit.com.au/~/media/climatetoolkit/reports/pdccf%20-%20getting%20effluent%20right%20-%20science%20-%202015.pdf

[22] For more information see http://australianpork.com.au/wp-content/uploads/2016/10/Annual-Report-2015-2016_web-1.pdf p 34 and http://www.porknews.com.au/media/0417G/0417book.html#p=14 pg 14

that reduce methane emissions are examples of this. For example, a farmer, in exchange for discounted product, could "sign away" the right to ACCUs to the manufacturer or supplier of the product, who could then sell these ACCUs in the offset market. A similar model is also foreseeable for the sale of less emissions-intense livestock genetics.

However, a natural and efficient point for scaling up abatement is much less obvious in the context of the multitude of sequestration activities or for the adoption of practices that may result in abatement from energy efficiency or methane and nitrous oxides efficiency. An efficient market interface is required to enable farmers to bundle up these components to on-sell – either directly or via a third party – to the offset market. It is entirely feasible that such an interface could also support other environmental service markets, to realise the multiple environmental benefits of many emissions reduction strategies (see section 5.5).

NFF appreciates that confidence in genuine abatement is a crucial foundation of the carbon market. Ongoing research is building the scientific knowledge to underpin a robust whole farm systems approach to carbon accounting[23] that could provide the underpinning of a bundled or farm system approach.

A robust whole farm approach that can harness digital technologies and existing industry-led initiatives is, in NFF's view, likely to improve efficiency in the reporting and administration of offset projects. Increasingly, farmers are utilising technologies and spatial information that could provide the underlying data sets for monitoring. The rapid adoption of digital agriculture technologies, combined with best management practice initiatives, provide an ideal starting point to explore opportunities to drive down participation costs and make carbon farming more attractive to more farmers.

KEY MESSAGE - The current design of carbon offset markets is inefficient, and overhead costs limit participation by most farmers. Reform is required to unlock the full carbon potential of Australian farms by improving the design of carbon markets to make them more accessible and more attractive for farmers

KEY MESSAGE - For most farmers, there are not yet cost-effective methods in place to enable participation in carbon markets, and many technologies are still in the development phase and are not yet "method-ready". Long term commitment to research is required to bring technologies and practices to a point where they are commercially viable.

5.5 – Direct regulation – vegetation management

Reductions in land clearing, resulting from the imposition of native vegetation management regulation on land managers by State Governments, has been the biggest sectoral contributor to emissions reductions in Australia since 1990, with net emissions declining by 85 per cent

[23] See for example http://www.dairyingfortomorrow.com.au/tools-and-guidelines/dairy-greenhouse-gas-abatement-calculator/ and http://www.piccc.org.au/WFSAM

from 1990 to 2012[24]. These regulations also set out to achieve biodiversity and other natural resource management goals.

What continues to be largely ignored in the public policy debate is the fundamental inequity of unfair regulation of vegetation. The small percentage of Australian farmers who wish to develop land and are unable to, due to regulation, have worn most of the cost of meeting Australia's climate goals without access to a market or payments to deliver this service.

Farmers are at the frontline of delivering environmental outcomes on behalf of the Australian community, but, under current environmental and vegetation management regulation, farmers bear an uneven distribution of risk and cost associated with the provision and maintenance of natural capital assets. While an individual farmer may capture the benefits of environmental management (and thus is likely to invest), many of the benefits are shared more broadly by the community. In the current regulatory environment, the community does not pay for the benefits that are provided by farmers.

Emissions reduction policies will work best where they drive improved natural resource management for both increased productivity and abatement, and where there is adequate reward for the ecosystems services that farmers provide to the wider community. To realise the potential for multiple benefits from emissions reduction policy, policies must boost confidence and encourage growth in both agricultural enterprises and emissions reductions projects while continuing to offer incentives to invest in, conserve and restore natural capital.

While the subject of continued academic debate and trial, the delivery of a properly functioning environment service market, for example for biodiversity or water quality, in Australia is still some-way off[25].

Many practices that can be adopted to manage for biodiversity outcomes, such as managing and protecting vegetation or improving soil function, also result in carbon sequestration benefits. Ensuring that ecosystem service markets and carbon markets can work together into the future should be at the forefront of considerations in the future design of the former. To reduce the cost barriers to participating in markets, farmers need to be able to "bundle up" all opportunities in an efficient way.

While market settings need to be such that there is no "double dipping" and that additionality is achieved, an income stream that recognises the delivery of multiple environmental services is worthy of more detailed exploration. This requires further exploration to:

- refine our understanding of the ecosystem services provided on farm and the interactions between services;
- develop smart approaches to aggregating and analysing data and information to provide an efficient and robust evidence base and monitoring;

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[24] Climate Change Authority (2014) Reducing Australia's Greenhouse Gas Emissions— Targets and Progress Review Final Report Pg 244

[25] see for example the recent exploration of market based approaches by the Productivity Commission in its review of Agriculture Regulation http://www.pc.gov.au/inquiries/completed/agriculture/report/agriculture.pdf (Chapter 3)

- develop decision support tools, to enable farmers to understand benefits and tradeoffs of different options for their business;
- develop the regulatory and market frameworks to support an environmental service market.

KEY MESSAGE - The regulation of native vegetation management by State Governments has enabled Australia to meet its emissions reduction commitments under Kyoto Agreements. The cost of achieving these targets has been predominantly worn by farmers, who have not had access to a market or payments for the delivery of this service. Rather than penalise, vegetation policies should recognise and reward farmers for sequestering carbon in vegetation. Ensuring that broader ecosystem service markets and carbon markets can work together into the future should be at the forefront of considerations in the policy design.

5.4 – Innovation to drive improvements in agricultural emissions intensity

The success of the agriculture sector in reducing our emissions intensity over the past few decades highlights the potential for innovation and R&D to drive further reductions in emissions intensity in the future. Examples of this include:

- In the dairy industry, the on-farm application of research related to cow nutrition, rumen microbiology and genetics has led to substantial increases in milk production from individual cows and improved feed conversion. This has resulted in the average methane intensity from Australian dairy cows reducing from 9.8 t CO_2e per tonne of milk solids in 1980 to 6.0 t CO_2e per tonne of milk solids in 2010[26].
- Between 1981 and 2010, the beef industry has decreased greenhouse gas intensity by 14%, from 15.3 to 13.1 kg CO_2-e per kilogram of live weight[27]. This has largely been driven by changes in herd management to improve productivity such as higher weaning rates, higher growth rates, heavier carcase weights, lower mortality rates and improved feed conversion.

Comprehensive analysis from the collaborative investment project *Whole farm systems analysis of greenhouse gas abatement options for the southern Australian grazing industries*[28] has shown that, in the main, a focus on reducing emissions to maximise carbon offset income was not the most profitable strategy for the farm. Rather, optimal strategies were those that focused on adopting practices that maximise productivity or profitability while also reducing emissions intensity. In the analysis of 30 potential strategies to reduce emissions on farms, the likely income from the sale of offsets was consistently an order of magnitude less than the added income from productivity gains.

Similarly, research findings from the National Agricultural Nitrous Oxide Research Program (NANORP) highlighted that mitigation and productivity need to be optimised for growers to engage in new strategies and actively participate in offset programs. The NANORP has

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[26] Moate et al (2014) *Mitigation of enteric methane emissions from the Australian dairy industry*, Proceedings of the 5th Australasian Dairy Science Symposium 2014 http://www.adssymposium.com.au/inewsfiles/2014proceedings/19MoateADSS2014.pdf

[27] Wiedmann et al (2015) Resource use and greenhouse gas intensity of Australian beef production: 1981–2010 Agricultural Systems Volume 133, February 2015, Pages 109–118 http://www.sciencedirect.com/science/article/pii/S0308521X14001565

[28] http://www.piccc.org.au/WFSAM

produced clear evidence that the use of the DMPP[29] coated urea does provide an 85% reduction in N_2O from that source across many industries. However, the absence of a significant carbon price signal, and the fact that DMPP does not provide a yield advantage to generate additional income required to accommodate the purchase of the DMPP product, means the use of this product it is not yet a commercially viable option. There is also growing evidence that the use of Polymer Coated Urea in combination with conventional urea is a viable mitigation option as it provides a more predictable release of N mineral compared to DMPP; however, the cost restriction still applies.

The research to date highlights the opportunity for R&D of mitigation options that concurrently reduce emissions and improve productivity and profitability as these will be more readily adopted by farmers as it makes business sense to do so. It will mean farmers adopt practice regardless of whether there is a carbon market incentive to do so.

Past co-investments in 'carbon farming' research have identified some promising avenues that, over time, are likely to drive down the emissions intensity of agricultural production. Opportunities include those related to:

- reducing methane emissions in dairy and beef cattle through genetic improvements, rumen technologies and feeding;
- reducing nitrous oxide emissions in cropping and pasture systems through fertiliser application efficiency, nitrification inhibitors in fertilisers, cover crops, sustainable tillage and irrigation management; and
- reducing emissions from intensive industries such as pork and poultry by better managing manure waste.

Reports commissioned by Meat and Livestock Australia (MLA)[3031] highlight the opportunities and associated costs of methane emissions reduction opportunities, Using the outcomes of the National Livestock Methane Program, MLA has comprehensively identified future research priorities for livestock industries[32].

By way of example, research to examine the methane reducing potential of feeding seaweed to livestock has shown that some algae could reduce methane by up to 99%. A trial in sheep has shown up to 80% reduction in methane with a diet that is 3% algae, and the first in-paddock trial on cattle is currently underway to examine the productivity and mitigation

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[29] DMPP is a type of chemical nitrification inhibitor that disrupts microbial production of N_2O.

[30] See MLA (2015) More meat, milk and wool: Less methane http://publications.mla.com.au/go/zrSrU8s8czsjsX4Y for a detailed consolidation of the outcomes of research into lowering methane emissions and raising productivity in Australia's livestock industries and the best future opportunities.

[31] See Cotter et al (2015) *A marginal abatement cost analysis of practice options related to the NLMP program* https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Environment-On-Farm/A-marginal-abatement-cost-analysis-of-practice-options-related-to-the-NLMP-program/2930

[32] See Black et al (2015) *National Livestock Methane Program, National Needs and Gaps Analysis* https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Environment-On-Farm/National-Livestock-Methane-Program-National-Needs-and-Gaps-Analysis/3196

outcomes. The seaweed used for the trials is wild-harvested at a cost of about $200/kg, but for this to be an enduring emissions reduction strategy, further development is required to provide an affordable, commercial supply chain of feed stock. Feasibility analysis indicates that algae production at scale and at a cost of about $1.50/kg will result in a commercially viable product, and this, combined with the ability to increase growth through retained energy has the potential to become a financially viable option[33].

Efficient fertiliser application has multiple benefits. The obvious benefit to the farmer is reduced input costs, and, in some farming systems, there are also benefits associated with reduced nutrient runoff and potential downstream impacts. However, an optimal fertiliser application regime is a complex interaction of soil moisture, soil carbon and crop performance, and more research is needed to better understand the ideal management regime to maximise yields and profitability while minimising emissions[34].

Simulation modelling[35] in Australia is providing greater confidence in the development of mitigation strategies for grain based cropping systems. These strategies confirm that increases in soil organic matter through rotations or the use of legumes as alternative sources of nitrogen are paramount. The simulation results also support the need for growers to undertake relatively deep soil sampling prior to sowing so they can take advantage of these nitrogen stores and more accurately determine their seasonal nitrogen fertiliser requirements to mitigation and productivity gains are optimised.

To assist improve nitrogen budgeting tools, further short term research is required to accurately quantify the variation between nitrous oxide and the much larger gaseous di-nitrogen losses which have a major impact on productivity. NANORP research has shown that for every kilogram of nitrogen emitted as N_2O emitted over a season, as much as 50 kg of di-nitrogen gas is emitted.

We know from previous research that nitrogen use efficiency is heavily influenced by within and between season climate variability which impacts on soil mineralisation; the timing, placement and actual quantity of fertiliser required; and the efficacy of Enhanced Efficiency Fertilisers. Longer term studies incorporating climate variability are needed to confirm preliminary observations which indicate that significant improvements in nitrogen use efficiency and decreased emissions intensity through reduced fertiliser inputs, taking into account previous land use (e.g. cereal vs legume and short term pasture phases), and the placement and timing of fertilisers, including alternative formulations and Enhanced Efficiency Fertilisers.

Long term studies are required to assess the impacts of conservation agricultural practices that promote carbon sequestration (e.g. zero-tillage and long term pasture phases prior to cropping) and N_2O emissions. Increased carbon availability is directly linked to increased

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[33] See Cotter et al (2015) *A marginal abatement cost analysis of practice options related to the NLMP program* https://www.mla.com.au/research-and-development/search-rd-reports/final-report-details/Environment-On-Farm/A-marginal-abatement-cost-analysis-of-practice-options-related-to-the-NLMP-program/2930 p. 4.

[34] See for example http://www.n2o.net.au for information about nitrous oxide opportunities

[35] For example APSIM (http://www.apsim.info/) and DSSAT (http://dssat.net/)

N_2O emissions (e.g. the sugar industry). Management strategies are required that ensure N_2O emissions do not negate the potential benefit of these practices in terms of greenhouse gas abatement and productivity.

Continued and sustained investment in R&D by industry and government will build on the gains we have made to date and drive further improvements and potential step changes in the carbon efficiency of our farming systems. As farmers adopt less emissions intense practices, the contribution of the land and agriculture sectors in the national greenhouse gas inventory will improve.

KEY MESSAGE – Investing in the R&D and extension of mitigation strategies that concurrently reduce emissions and improve productivity and profitability will be adopted by farmers as it makes business sense to do so. As farmers adopt less emissions intense practices, the contribution of the land and agriculture sectors in the national greenhouse gas inventory will improve over time.

5.5 – The innovation investment challenge

The importance of innovation to unlock the carbon potential in the land and agriculture cannot be understated. As highlighted in the preceding sections, investment is required to develop strategies to drive down emissions intensity of production and to crystallise the specific methods required for participation in the offset market.

Governments and the agriculture sector have recognised the importance of collaboration on climate research since 2008 when the first Climate Change Research Strategy for Primary Industries (CCRSPI) was developed[36]. CCRSPI supports the National Primary Industries RD&E Framework, a strategic partnership between the Australian, State and Northern Territory governments, Rural Research and Development Corporations (RDCs), CSIRO and universities. CCRSPI partners have been co-investing in climate change research, development and extension since that time, and, in 2017, the third iteration of the strategy is due to be released. The partnership is an ideal focal point for continued discussion and collaboration, to identify priorities and to facilitate co-investment.

Long term investments are required

As highlighted in Section 5.4, some research priorities are short-term, where additional investigation will bring the outcomes of past investment programs to fruition. Others are longer term propositions with "step-change" potential.

The long term nature of research investment is evident when we reflect on past experiences. Even where technology and scientific understanding is known, the development of an approved ERF method takes about 18 months to 2 years of technical effort. Preceding this, there is the lead time required to bring sufficient, robust scientific evidence to demonstrate that an emissions reduction strategy or technology is "method ready". For example, to

[36] http://www.ccrspi.net.au/

provide the evidence based for the dietary oils in dairy cows method, approximately 6 years of research was required.

The algae feed supplement example provided above is another example of the long lead times for research. Initial work on this concept commenced in 2012, with a project funded under the National Livestock Methane Program. Cue forward to 2017, and the first in-paddock trial on cattle is currently underway to examine results in the paddock. Further development is still required to provide an affordable, commercial supply chain of feed stock, with a likely minimum 2-3 years of development time. Thus, the time from research at the laboratory bench to a commercially "adoptable" practice in the paddock for this technology is at least 8 years in the making.

As highlighted by the examples above, sustained commitment by Government and industry to climate research funding is required to bring new ideas, technologies and advances in practice to commercial realities.

Incentives are required to facilitate investment

The agriculture sector has shown its willingness to invest in climate research using industry funds through the Rural Research and Development Corporation (RDC) model. There are genuine incentives for industry to do this research – both in terms of productivity benefits and the need to build the capability to demonstrate to our markets that we are responsible producers. However, some emissions reduction R&D has long lead times, requiring sustained investment over time. The very nature of the challenge means that some research will be need to be "far-horizon", making it riskier and less attractive for industry and private investment. The statutory framework and funding agreements in place in the RDC model means that industry investment must be made in a way that delivers demonstrable value to levy payers. This limits the ability for industry to invest significantly in far horizon or blue sky research.

By way of example, analysis conducted by Meat and Livestock Australia (MLA) has examined the likely cost, mitigation potential and productivity impacts of methane research priorities (Figure 2). This highlights that there are some research areas where mitigation potential is significant (for example >20%) but the productivity gain is limited (<5%), which means industry is unlikely to invest in these areas without incentives to do so.

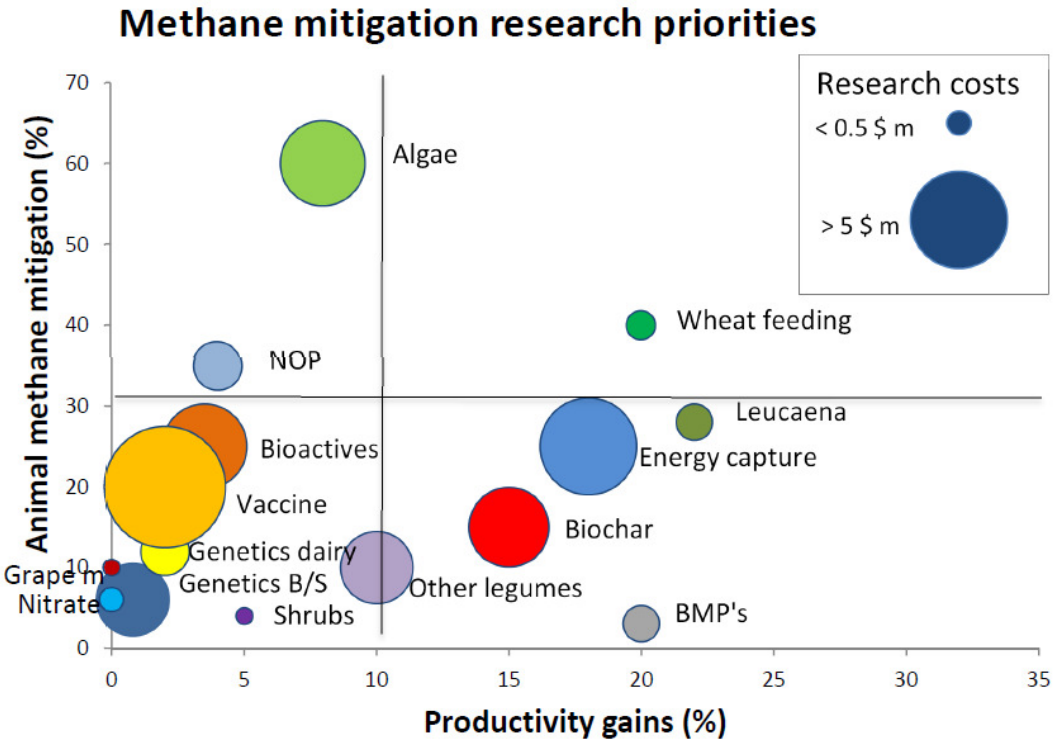

Figure A. Relationship between the methane mitigation potential in individual animals and estimated productivity gain for a range of methane mitigation strategies examined. The size of the bubble-dot represents a relative estimate of the likely cost and risk of further research required. The highest priority strategies would be in the upper right segment. The lines are the objectives MLA set for potential achievement. Genetics B/S is for beef and sheep.

Figure 2 Methane Research Priorities (source MLA[37])

A specific example where industry funding of mitigation research has not continued is research into a vaccine to further reduce methane emissions by acting against methanogens. Preliminary work conducted by Australian scientists indicates that a vaccine is a possibility, though more work needs to be done to prove the potential. Estimates from the National Livestock Methane Program indicate that a $10 million investment over 5 years would be required to facilitate collaboration with New Zealand to further this research in the Australian context. It is hoped that vaccination will be a low cost technology that is able to be readily adopted, regardless of the farming system. Such a technology would be reasonably easy to implement in grazing systems across Australia, given sheep and cattle are currently mustered once to twice a year for other vaccinations, herd health and management. Using a conservative estimate of 20% adoption by producers, MLA estimates that a vaccine could result in a 2.2 million tonne CO_2-e reduction in emissions across the beef, dairy and sheep industries in Australia[38].

37 MLA (2015) More meat, milk and wool: Less methane. Outcomes are from the National Livestock Methane Program http://publications.mla.com.au/go/zrSrU8s8czsjsX4Y

[38] Assumes current emissions profile of industries and 20% industry adoption

Another example is the research commenced by the Dairy Futures CRC which looked at selection for lower methane emitting animals has been promising to date. The CRC, with the support of Australian Government funding, aimed to identify gene markers that are linked to feed conversion efficiency. Improved feed conversion efficiency equates to lower emissions intensity and increased profit. While there have been some initial outcomes of the research, further work over a longer timeframe is required to better understand full implications such as any changes to milk composition as a result of the improved feed conversion. The Dairy Futures CRC has now completed its term, and funding to support ongoing genetic research into low methane emitting animals is limited.

The research components of the Carbon Farming Futures package are an example of where Commonwealth investment very successfully leveraged co-investment from industry, the private sector and research institutions. For example, under the Climate Change Research Program (CCRP), which ended on 30 June 2012, a total of $130 million was invested as part of the collaboration, with the Australian Government component of this $46.2 million[39].

Government investment of $13.84 million in Stage 2 of the National Livestock Methane Program leveraged an additional $16.08 million in cash and in-kind contributions from industry, research and private partners, for a total investment value of $29.92 million.

Similarly, the Rural Research and Development for Profit Programme[40], managed by the Department of Agriculture and Water Resources, has also resulted in significant research collaborations and co-investment in a number of areas related to emissions reduction. For example, the "More profit from nitrogen: enhancing the nutrient use efficiency of intensive cropping and pasture systems" project, managed by the Cotton Research & Development Corporation, involves 18 partners from industry, private companies, state government and research institutions. An investment of $5.9 million by the Australian Government in this project has leveraged $4.2 million in cash and $5.6 million in in-kind investment from project partners. This work builds on the knowledge base built from past investments through NANORP.

In NFF's view, Government policy settings should incentivise industry to pursue the research that it is unlikely to fund on its own. A co-investment approach model such as that adopted in the Carbon Farming Futures package or the Rural R&D for Profit Programme has demonstrated success in the past to leverage industry, research providers and private sector investments. Such an approach:

- recognises that carbon research is often too "risky" to fit inside the demonstrable value parameters of industry levy-funded research; and
- enables industry as a whole to capture the value of the carbon benefit realised from its investment and adoption of carbon efficient practices, which in turn is captured through downward trends in the national inventory.

[39] http://www.agriculture.gov.au/ag-farm-food/climatechange/australias-farming-future/climate-change-and-productivity-research

[40] http://www.agriculture.gov.au/ag-farm-food/innovation/rural-research-development-for-profit

KEY MESSAGE – Past Commonwealth investment programs in emissions reduction R&D have been extremely successful in leveraging co-investment and building Australian research capability. Future policies should incentivise industry to pursue the research that it is unlikely to fund on its own.

7. International units

There is great opportunity for Australia to become a producer of credible carbon units for the international market. To enable this opportunity, the right international policy settings are required to build a strong market framework that both benefits Australian producers and our emission reduction goals. Linking carbon markets only makes them more interdependent and therefore sensitive to change that occurs elsewhere. Australia needs to be confident that the international market is a stable place for trade and that our participation in a global market place supports the achievement of our emission reduction goals. Similarly, the purchase of credible, lower cost international credits may be an efficient pathway for Australian businesses to meet any future carbon liabilities.

Many agribusinesses operate internationally. It is foreseeable that a multi-national company may seek to offset their obligations in another jurisdiction by purchasing credits generated in Australia by their customers or suppliers here. As highlighted in Section 5.3, input suppliers such as fertiliser companies or the downstream purchasers of agricultural produce (such as meat or milk processors) may be a natural point of carbon aggregation in Australia. Many of these same companies may have carbon offset obligations imposed on them in other countries, thus, access to ACCUs can broaden the scope of market opportunities for Australian farmers.

The European Union emissions trading system (EU ETS) is currently the biggest source of demand for international credits, making it the main driver of the international carbon market and the main provider of clean energy investment in developing countries and economies in transition. As consequence, the EU ETS has placed restrictions on the types of units that may be used within domestic compliance schemes to ensure they represent genuine emissions reductions. Of most notable consideration from an Australian perspective is the exclusion of credits from afforestation or reforestation (LULUCF) projects.

As detailed above, projects associated with vegetation management continue to dominate the ERF with more than half of the ACCUs issued going to these projects. Given the exclusion of afforestation or reforestation projects from the EU ETS, the current policy settings of the ERF mean that the majority of ACCU producers in Australia would be excluded from participation in the world's largest carbon market. If Australia is to be a genuine player in an international carbon market, it is therefore crucial to unlock the potential of the Australian agricultural industry to generate credible ACCUs that are saleable.

NFF urges the Government to engage actively in the international discussions around Article 6 of the Paris Agreement, to ensure that international market settings benefit our national context.

KEY MESSAGE – Credible international units may provide a lower cost pathway for Australian businesses to meet any future carbon liability. A well-designed international market may also provide opportunities for Australian farmers and agribusinesses as it broadens the carbon market place to more purchasers of ACCUs.

8. Summary of key messages

1. **Policy stability is crucial for future investment in our electricity market.** Government climate policy must not favour specific technologies but rather enable the technologies to compete on their merits. Based on current evidence, the NFF believes the lowest cost pathway to a low emissions future is some form of market-based approach for electricity generation.

2. **Policy reform is required to harness the opportunity that is provided by decentralised generation facilities on farms and in the supply chain.**

3. **Incentivising energy productivity is a significant opportunity for low cost abatement. Past investments in exploring energy productivity on farms provide a significant platform of knowledge to promote further efficiency improvements.**

4. **A focus on emissions intensity supports growth in global agricultural production to meet growing global food and fibre demand, while still contributing to emissions reduction efforts.**

5. **Policies that encourage innovation and adoption of low emissions technologies and participation in carbon offset markets are most appropriate for agriculture.** Policies such as mandatory coverage in trading schemes or direct regulation do not suit the agriculture sector.

6. **The current design of carbon offset markets is inefficient, and overhead costs limit participation by most farmers.** Reform is required to unlock the full carbon potential of Australian farms by improving the design of carbon markets to make them more accessible and more attractive for farmers

7. **For most farmers, there are not yet cost-effective methods in place to enable participation in carbon markets, and many technologies are still in the development phase and are not yet "method-ready".** Long term commitment to research is required to bring technologies and practices to a point where they are commercially viable.

8. **The regulation of native vegetation management by State Governments has enabled Australia to meet its emissions reduction commitments under Kyoto but the cost of achieving these targets has been predominantly worn by farmers, who have not had access to a market or payments for the delivery of this service.** Rather than penalise , vegetation policies should recognise and reward farmers for sequestering carbon in vegetation. Ensuring that broader ecosystem service markets and carbon markets can work together into the future should be at the forefront of considerations in the policy design.

9. **Investing in the R&D and extension of mitigation strategies that concurrently reduce emissions and improve productivity and profitability will be adopted by farmers as it makes business sense to do so.** As farmers adopt less emissions intense practices, the contribution of the land and agriculture sectors in the national greenhouse gas inventory will improve.

10. **Past Commonwealth investment programs in emissions reduction R&D have been extremely successful in leveraging co-investment and building Australian research capability.** Future policies should incentivise industry to pursue the research that it is unlikely to fund on its own.

11. **Credible international units may provide a lower cost pathway for Australian businesses to meet any future carbon liability.** A well-designed international market may also provide opportunities for Australian farmers and agribusinesses as it broadens the carbon market place to more purchasers of ACCUs.