


**From:** Stefan Martin  
**Sent:** Thursday, 19 March 2009 3:27 PM  
**To:** Committee, PIR (REPS)  
**Cc:** Kathleen Plowman; Stefan Martin  
**Subject:** Submission to the Standing Committee on Primary Industries and Resources

19 March 2009

Committee Secretary  
Standing Committee on Primary Industries and Resources  
PO Box 6021  
House of Representatives  
Parliament House  
CANBERRA ACT 2600  
AUSTRALIA

<b>Submission No:</b> .....	16
<b>Date Received:</b> .....	19-3-09
<b>Secretary:</b> .....	

Dear Committee Secretary,

**Re: Submission to the inquiry into the role of government in assisting Australian farmers to adapt to the impacts of climate change**

Australian Pork Limited (APL) welcomes the opportunity for comment on the House of Representatives Standing Committee on Primary Industries and Resources (the Committee) inquiry into the role of government in assisting Australian farmers to adapt to the impacts of climate change. The Committee invited stakeholder views on current and prospective adaptations to the impacts of climate change on agriculture and, in particular, the role of government to assist industries with the adaptation process.

APL is the national representative body for Australian pork producers and works with the broader pork industry. It is a producer-owned, not-for-profit company combining marketing, export development, research & innovation and policy development to assist in securing a profitable and sustainable future for the Australian pork industry. APL's members currently represent approximately 92 per cent of Australian pork production.

In case you need any further information please do not hesitate to contact APL Policy Analyst Stefan Martin on 1800 789 099 or [stefan.martin@australianpork.com.au](mailto:stefan.martin@australianpork.com.au)

Yours sincerely,



20/03/2009

# **AUSTRALIAN PORK LIMITED**

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**Submission to the House of Representatives  
Standing Committee on Primary Industries and  
Resources**

***Inquiry into the Role of Government in Assisting  
Australian Farmers to Adapt to the Impacts of  
Climate Change***

**20 March 2009**



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## 1. Executive summary

Australian Pork Limited (APL) welcomes the opportunity for comment on the House of Representatives Standing Committee on Primary Industries and Resources (the Committee) inquiry into the role of government in assisting Australian farmers to adapt to the impacts of climate change. The Committee invited stakeholder views on current and prospective adaptations to the impacts of climate change on agriculture and, in particular, the role of government to assist industries with the adaptation process.

There is no doubt that the Carbon Pollution Reduction Scheme (CPRS) will create severe immediate and long-term direct and flow-on effects on the pork industry when it becomes operational in 2010, and even more so when agriculture becomes a covered sector under the CPRS from 2015. The latest modelling exercise undertaken by the Australian Farm Institute (AFI) and the Centre for International Economics<sup>1</sup> concludes: *“The direct cost of purchasing permits would be significant. These costs could not be easily passed on to consumers and so would be borne by the producer. At a commodity level, the consequence of this is reduced production and income. At the same time, the indirect effects of emissions trading (through increases of key input prices) will be smaller, but still significant.”*

The impacts of the CPRS will contribute to the existing sustainability challenges for pork producers in Australia and potentially threaten long-term competitiveness of the industry. Given its international exposure (in terms of both import and export competitiveness), the pork industry, like much of the agricultural sector, has practically little ability to pass on anticipated increases in costs arising from rising energy and energy dependent farm inputs prices. It is therefore vulnerable to the resulting increasing costs, both direct and indirect, from the introduction of a CPRS in 2010, and then later in 2015 when agriculture (in all likelihood) will be covered in a CPRS.

Results from the AFI modelling mentioned above suggest that by 2030 the costs for emissions permits will account for 5.5 per cent of the farm gate price for pork. At the same time, the farm gate price for pork is projected to rise by 1.7 per cent, while the farm gate price net of permit costs is projected to fall by 3.9 per cent relative to business as usual. This will lead to a projected decline in production by 4.5 per cent by 2030. With the combined impact of falling net prices (farm gate prices net of permit costs) and production, by 2030 the gross value of pork production (GVP) is projected to fall by 10.44 per cent or \$318.2 million.

The Australian pork industry has undertaken a proactive approach to environmental sustainability over the years and has a history of significant investments into R & D in this area. Most of the emissions associated with pork production relate to on farm emission of methane from effluent lagoons and nitrous oxide following the land application of effluent and manures. APL is presently working collaboratively with the joint Rural RDC efforts to develop life cycle assessment for agricultural industries; and more pork specific, APL is seeking to better understand the implications of different pig farming systems, diets and waste management options within a life cycle context. APL believes this data will provide a

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<sup>1</sup> Australian Farm Institute, February 2009, available for purchase from [http://www.farminstitute.org.au/catalog\\_31033/Research\\_Reports](http://www.farminstitute.org.au/catalog_31033/Research_Reports)

valuable and integral contribution to development of emission factors for pig production if agriculture enters the CPRS in 2015.

Key information gaps relevant to the pork industry remain concerning life cycle assessment; the amount of methane and nitrous oxide emissions from deep-litter pig sheds and waste management systems; and bioenergy, including performance of lagoons as well as pig farming systems in differing climates and the lack of experience among technology providers to build, commission and operate biogas capture systems. Other information gaps remain around on-farm preparedness; measuring emissions and data collection procedures; and development of commodity specific decision support frameworks and tools to better inform farmers and enable improved productivity and profitability, as well as further reduce their environmental footprint.

For agriculture to be included in the CPRS from 2015, considerable government funding assistance is required to target existing information gaps across agriculture. Failure to create a comprehensive understanding of the impact of climate change on agriculture and the role of the various sectors (such as the pork industry) in particular could lead to perverse outcomes through implementation of the CPRS and put at risk the long-term sustainability of Australia's food production and related export industries. APL is particularly concerned that the pork industry's adaptive capacity for adaption to climate change does not suffer. The CPRS has the potential to penalise the industry's adaptive capacity since pig farming is a low margin business and farm income is likely to be further reduced in the short to medium term, through the CPRS, thereby limiting producers' ability to undertake investments into climate change adaption. Further, given the industry's international exposure (in terms of both import and export competitiveness), the pork industry, like much of the agricultural sector, has practically little ability to pass on anticipated increases in costs arising from rising energy and energy dependent farm inputs prices. Critically the proposed scheme currently fails to address the issue of competing imports. Without an ability to raise import prices, there is limited ability to pass on costs to local consumers.

As the CPRS will increase downward pressure on profit margins and thus significantly reduce business income, which is unlikely to be recovered through price increases, it is absolutely critical, that a system of financial incentives be created by government to encourage producers to make progress on reducing emissions on farm prior to 2015 and that this should be done in consultation with industry.

Given the potential impacts of climate change on the pork industry and the tight timeframe behind the government work program for launching the CPRS in 2010 and including agriculture from 2015, it is necessary that government undertake additional efforts to encourage early adaptation. These efforts include additional financial assistance for climate change research and adaptation and, even more important, removal of regulatory burdens and impediments for producers that limit their adaptive capacity to respond to climate change. The governments' role in augmenting the shift towards sustainable production practices and promoting research, extension and training is vital for securing superior outcomes for both adaptive capacity and global competitiveness of Australian agriculture in a climate change environment.

To create world class innovation and maximise the resilience and adaptive capacity of agriculture, government funding to agriculture R & D needs to be significantly increased and should be proportionally in line with the support given to geosequestration from coal fired power stations. Geosequestration - R & D has recently received some \$500 million in funding from the Federal Government. Agricultural emissions are equal to approximately 35 per cent of the emissions of the coal industry (National Greenhouse Gas Inventory 2006) and are potentially more easily remedied. A significant increase on top of the current available funding is required to address existing R & D gaps and identify areas of future work to successfully reduce the greenhouse gas emissions from Australian agriculture.

APL's key recommendations for government efforts that need to be undertaken to maintain a long-term sustainable pork industry, both economically and environmentally, comprise:

**I) Provide additional funding of climate change related industry R & D**

There is a need for additional research and extension to address information gaps in life cycle assessment; the amount of methane and nitrous oxide emissions from different pig farming systems; measures to improve on-farm preparedness; measuring emissions and data collection procedures; and development of commodity specific decision support frameworks and tools to better inform farmers and enable improved productivity and profitability, as well as further reduce their environmental footprint.

**II) Coordinate the suite of climate change R & D**

A nationally coordinated approach to climate change related research is necessary to facilitate knowledge transfer between different sectors, streamline the whole process and allocate government and industry funds in the most efficient way.

**III) Develop a communication strategy for agriculture**

Pork producers need to be subject of joint APL & federal and state government communication programs to clarify pork producers' options to adapt to climate change and facilitate uptake of sustainable farming practices. Raising awareness for, and increasing levels of sustainable farming practices needs to be an essential part of the government's strategy to facilitate climate change adaptation of agriculture.

**IV) Remove government assistance for biofuels**

Mandating ethanol content in fuel and encouraging grain-based biofuel production diverts grain from human food production, creates a food versus fuel relationship and eventually increases food prices for consumers. Incentives must be redirected into second-generation biofuels that are economically viable.

**V) Develop drought assistance to facilitate on-farm preparedness for climate change**

Future drought policy should be aimed at assisting the agricultural sector to adjust to climate change and prepare for extreme climatic conditions.

**VI) Remove regulatory impediments**

Differences in regulation between states, unnecessary double regulation and interference with other regulation contribute to the regulatory burden on businesses and can significantly increase cost of compliance for pork producers.

## 2. Introduction

Australian Pork Limited (APL) welcomes the opportunity for comment on the House of Representatives Standing Committee on Primary Industries and Resources (the Committee) inquiry into the role of government in assisting Australian farmers to adapt to the impacts of climate change. The Committee invited stakeholder views on current and prospective adaptations to the impacts of climate change on agriculture and, in particular, the role of government to assist industries with the adaptation process.

APL is the national representative body for Australian pork producers and works with the broader pork industry. It is a producer-owned, not-for-profit company combining marketing, export development, research & innovation and policy development to assist in securing a profitable and sustainable future for the Australian pork industry. APL's members currently represent approximately 92 per cent of Australian pork production.

## 3. Australian pork industry structure and operations

Australia's pigmeat production is built around approximately 1,895 pork producers with an average herd size of 179 sows (as of 30 June 2007).<sup>2</sup> The Australian Bureau of Statistics (ABS) on 30 June 2008 recorded approximately 2.2 million pigs, with the largest state herds located in New South Wales and Queensland (see Table 1).<sup>3</sup> The same ABS data indicates that the national breeding herd in 2005-06 consisted of 302,000 sows (excluding gilts), declining by 20.5 percent to 240,000 sows in 2007-08. This significant contraction of the industry was caused by adverse economic conditions, which have seen many smaller producers leave the industry and existing producers increase their size of operations in an attempt to remain viable.

Table 1 Pig Numbers in Australia per State 2003-04 to 2007-08 (in '000)

State	2003-04	2004-05	2005-06	2006-07	2007/08
NSW	683	653	660	741	646
VIC	541	545	605	536	397
QLD	667	696	715	669	541
SA	357	358	427	347	317
WA	270	274	277	304	266
TAS	14	14	16	20	14
NT	3	3	2	na	na
ACT	na	na	na	na	na
Australia total	2533	2543	2702	2617	2181

Source: ABS<sup>4</sup>

It is estimated that the top 50 producers in Australia account for some 45 per cent of production. The estimated Gross Value of Production (GVP) for Australian pork production was \$944 million for the period 2006-07 decreasing to \$880 million for the period 2007-08. Latest ABS forecasts predict GVP for pork production to increase to \$980 million in

<sup>2</sup> Australian Pork Limited 2008, Australian Pig Annual 2006-2008

<sup>3</sup> Australian Bureau of Statistics (ABS): Principal Agricultural Commodities 7111.0

<sup>4</sup> Australian Bureau of Statistics (ABS): Principal Agricultural Commodities 7111.0

2008-09.<sup>5</sup> Based on this forecast Pork represents approximately 2.3 per cent of total Australian farm production.<sup>6</sup> This figure has remained relatively consistent since 2005.

The Australian pork industry provides a significant positive impact to local, regional, state and national economies through substantial income generation and employment. In 2004, the pork production sector generated \$3.2 billion in output and \$967 million in value added product<sup>7</sup>, compared to an estimated \$2.9 billion in generated output, \$840 million in value added product and 7,928 full time jobs when flow on effects are taken into account in 2006-07.<sup>8</sup>

Around 56 per cent of the 5 million pigs slaughtered in the Australian industry today are part of an integrated supply chain, which includes primary processing and production. The remaining pigs sold for slaughter are sourced either through saleyards (5 per cent), spot market or through forward and general contracts.

#### **4. Sustainability challenges for the pork industry**

The pork industry has a strong record of developing and adopting pig farming systems capable of maintaining a balance between agricultural productivity, and managing environmental values. However, severe economic challenges over the past years in combination with unnecessary regulatory burdens and a lack of harmonisation of public policy across states have contributed to a significant contraction of the industry. Sustainable production, both economically and environmentally, is vital for the Australian pork industry to maintain domestic and international competitiveness. To facilitate environmentally sustainable production, APL in late 2008 embarked on the process of developing a National Environmental Sustainability Strategy for the pork Industry.

The National Environmental Sustainability Strategy is currently in draft form. It builds on previous environmental strategies and incorporates current pork industry best management practices (BMP). It will assist APL and the industry as a whole to influence and manage sustainability challenges effectively in relation to the regulatory environment, transporters, processors, retailers, consumers and the broader Australian community as well identify key areas for further research and development and policy development. Figure 1 below identifies the key environmental sustainability challenges for the Australian pork industry. It shows the wide-ranging effects of climate change and the potential impacts, either direct or indirect, of an Australian emissions trading scheme on the key environmental sustainability challenges facing the Australian pork industry.

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<sup>5</sup> ABARE 2008, Australian Commodities December Quarter 08.4, available at: [http://www.abare.gov.au/publications\\_html/ac/ac\\_08/ac\\_08.html](http://www.abare.gov.au/publications_html/ac/ac_08/ac_08.html)

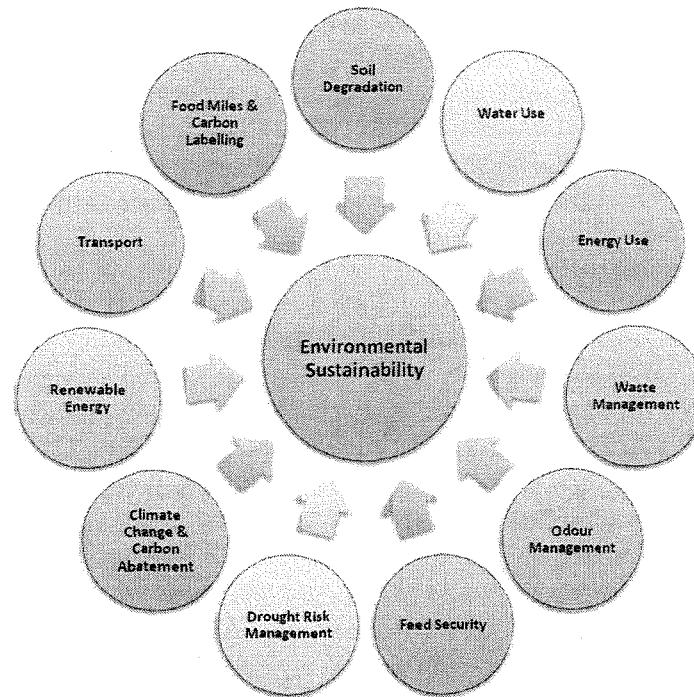
<sup>6</sup> ABARE 2008, Australian Commodities December Quarter 08.4, available at: [http://www.abare.gov.au/publications\\_html/ac/ac\\_08/ac\\_08.html](http://www.abare.gov.au/publications_html/ac/ac_08/ac_08.html)

<sup>7</sup> Western Research Institute 2005, Socio-Economic Impacts of the Australian Pork Industry

<sup>8</sup> Western Research Institute 2008, Socio-Economic Impacts of the Australian Pork Industry - preliminary report



Figure 1 Key environmental sustainability challenges faced by the pork industry



## 5. Climate change and the pork industry

The Australian pork industry is cited in the Australian Governments' CPRS Green Paper published in July 2008 as the seventh biggest greenhouse gas emitter per unit of revenue of all Australian emissions-intensive-trade-exposed (EITE) industries. However, first impressions are sometimes misleading. A closer examination of the figures in the CPRS Green Paper reveals that pork greenhouse gas emissions as a share of total Australian greenhouse gas emissions are 6.75 times smaller than sheep emissions; 8.5 times smaller than dairy cattle emissions; and 28 times smaller than beef cattle emissions (CPRS Green Paper page 498).

The black coal sector, for example, contributes 5 per cent of total national greenhouse gas emissions compared with only 0.4 per cent contributed by the pork industry. This means that the contribution of the black coal sector is 12.5 times larger in terms of total emissions and therefore has a significantly bigger environmental footprint.

Most of the emissions associated with pork production relate to on farm emission of methane ( $\text{CH}_4$ ) from effluent lagoons and nitrous oxide ( $\text{N}_2\text{O}$ ) following the land application of effluent and manures.<sup>9</sup> This compares to emissions of other industries such as cattle and sheep that are dominated by enteric methane emissions. Enteric fermentation of cattle is responsible for 50.1 per cent of total agricultural greenhouse gas emissions in Australia; this compares to 16.4 per cent of emissions from sheep enteric fermentation.<sup>10</sup>

<sup>9</sup> Cederberg, C., (2003) LCA of Animal Products, In Environmentally Friendly Food Production, Woodhead Publishing, UK

<sup>10</sup> Department of Climate Change, National Greenhouse Gas Inventory 2006, available from <http://www.climatechange.gov.au/inventory/2006/index.html>

The pork industry has been experiencing impacts of climate change over a long period, primarily from the impact of droughts. These comprise, for example, shortages of feed, water and other farm inputs. Climate change extends the duration and further exacerbates the effects of drought leading to cost of production above sustainable levels and forcing producers out of the industry. The adaptation to climate change effects on farm is part of the solution; mitigation of greenhouse gas emissions, often referred to as *carbon abatement*, needs to be broadly adopted to address effects of climate change in the long term and secure sustainable production.

### **5.1. The pork industry's adaptive capacity**

As outlined by the Australian Bureau of Agricultural and Resource Economics (ABARE), agriculture's capacity for adaptation to climate change via cost effective and efficient adaptation strategies is dependent on a wide range of factors.<sup>11</sup> At a national level, the factors that influence adaptive capacity include the level of national income, technological advancement, and relevant infrastructure. At the farm level, the factors that influence adaptive capacity include farmer education, diversity of on- and off-farm income sources, and levels of income. In particular, a lack of diversity of income sources is one of the critical factors constraining adaptation, resulting in high levels of vulnerability to external shocks.

In practice, pork producers often operate specialized farms and thus already have a reduced adaptive capacity to deal with climate change due to lack of diversified income streams. Over the last ten years, pork production has become vertically integrated with increasing specialisation and producer focus on niche markets. This situation is further exacerbated by lower farm income due to reduced profit margins and increased pressure from import competition as outlined previously. Therefore, it is important that the Government recognise that the pork industry is different in terms of its adaptive capacity compared to other agricultural industries.

To overcome these challenges and improve pork producers' adaptive capacity, APL is undertaking ongoing initiatives, which comprise for example:

- development of risk management tools and producer training programs;
- increasing uptake of industry best management practices (e.g. improved water and feed usage, manure management and environmental management systems (EMS));
- diversification of farm income via beneficially reusing and value adding to low return agricultural products, by-products and wastes (e.g. selling manure as fertilizer or bioenergy production on farm); and
- reducing cost of production (e.g. APL and Pork CRC investments into reducing diet costs through increased usage of innovative feed grains; improving herd feed conversion (HFC) and improving sow productivity).

### **5.2. Impacts of the CPRS on the pork industry's adaptive capacity**

APL is particularly concerned that the pork industry's capacity for adaptation to climate change does not suffer from adverse impacts of the CPRS. From a pork industry perspective, the CPRS will clearly penalise the adaptive capacity of the industry since it is a low margin

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<sup>11</sup> ABARE (2007), Adapting to climate change - issues and challenges in the agriculture sector, available at [http://www.abareconomics.com/interactive/ac\\_mar07/hm/a2.htm](http://www.abareconomics.com/interactive/ac_mar07/hm/a2.htm)

business and farm income is likely to be further reduced in the short to medium term, limiting producers' ability to undertake investments into climate change adaptation. This impact is even more severe because of existing import competition and highlights the need for specific government support to offset the adverse effect on competitiveness.

Emission trading via the proposed CPRS has the potential to significantly increase cost of production for the industry and put at risk the long-term sustainability of the pork industry in Australia. Pork production is heavily energy and fuel dependant; more than 62 per cent of costs of production are likely to increase because of rising fuel/energy prices and their effect on energy dependent inputs following the introduction of the CPRS in 2010.

The level of impact on on-farm costs depends on the price for carbon pollution permits. Modelling by the Australian Farm Institute (AFI)<sup>12</sup> published in September 2008 shows that pork producers will face significant reductions in cash margins. Based on a carbon price from \$20 up to \$45 per tonne CO<sub>2</sub>-equivalents, estimated reductions of 3 per cent to over 8 per cent are likely to occur during 2010-2015, and may exceed 25 per cent after agriculture is a covered sector in 2015.

In February 2009, the AFI released its most recent modelling report of cost impacts of emission trading on agriculture by sector.<sup>13</sup> The results of this AFI modelling exercise suggest that under present industry structures, and assuming limited scope for reducing emissions while maintaining production by commodity, the direct cost of purchasing permits would be significant. See Box 1 below for pork specific modelling results.

**Box 1 Projected cost impacts of emission trading on the pork industry (Source AFI)**

**Direct impacts**

- Under the conservative scenario, by 2030 emissions permit costs are projected to account for 5.5 per cent of the farm gate price for pork. These costs could not be easily passed on to consumers and so would be borne by the producer.
- Under the conservative scenario, by 2030 the farm gate price for pork is projected to rise by 1.7 per cent, while the farm gate price net of permit costs is projected to fall by 3.9 per cent relative to business as usual. At a commodity level, the consequence of this is reduced production and income.
- Under the conservative scenario, by 2030 production is projected to fall from its business as usual scenario level by 4.5 per cent for pork.
- With the combined impact of falling net prices (farm gate prices net of permit costs) and production, by 2030 the gross value of pork production (GVP) is projected to fall by 10.44 per cent or \$318.2 million. At the same time, the indirect effects of emissions trading (through increases of key input prices) will be smaller, but still significant.

**Indirect impacts**

- Electricity prices are projected to be 28 to 32 per cent above baseline level in 2030 and 45 to 51 per cent above baseline level in 2050, depending on the scenarios.

<sup>12</sup> Australian Farm Institute "Preliminary Modelling of the Farm Level Impacts of the Australian Greenhouse Emissions Trading Scheme" Research Report Sept 2008. A summary of this report is available from APL.

<sup>13</sup> Australian Farm Institute, February 2009, Some Impacts on Agriculture of an Australian Emissions Trading Scheme, available from [http://www.farminstitute.org.au/catalog\\_31033/Research\\_Reports](http://www.farminstitute.org.au/catalog_31033/Research_Reports)

- By 2050 the price of petroleum and coal products are projected to increase by 20 to 22 per cent, while the gas price will be 4 to 5 per cent above business as usual.
- Transportation prices are projected to increase by 4.6 per cent to 5.3 per cent from business as usual levels in 2030. Transportation prices are projected to 8.7 per cent and 9.9 per cent respectively from the business as usual level in 2050.

Cost increases such as outlined above will further reduce producer's ability to invest into emission mitigation measures in order to adapt to climate change; in particular, because pork producers already operate cash flow intensive and low margin businesses, which have been adversely affected by the current drought and market conditions. Further, given its international exposure (in terms of both import and export competitiveness), the pork industry, like much of the agricultural sector, has practically little ability to pass on anticipated increases in costs arising from rising energy and energy dependent farm inputs prices. Importantly, the proposed scheme currently fails to address the issue of competing imports. Without an ability to raise import prices, there is limited ability to pass on costs to local consumers.

As the CPRS will increase downward pressure on profit margins and thus significantly reduce business income, which is unlikely to be recovered through price increases, it is absolutely critical, that a system of financial incentives be created by government to encourage producers to make progress on reducing emissions on-farm prior to 2015 and that this should be done in consultation with industry.

It is also critical that broad comparable carbon constraints are introduced by competitor countries on their respective agricultural industries before the proposed 2020 date. This is necessary to create a level playing field internationally. Presently Australia's major pork competitors, Canada, the United States and Denmark (covered by the multi country, multi sector EU Emission Trading Scheme) have no stated intentions of introducing an ETS covering agricultural emissions that would similarly increase the cost of production for their respective pig industries.<sup>14</sup>

## **6. Climate change adaptation strategies for pork producers**

Environmentally sustainable production is a key obligation for any primary industry seeking a long-term future. The Australian pork industry has a proactive approach to environmental risk management including a holistic approach to waste minimisation, as well as pollution prevention and beneficial reuse of wastes. These strategies aim to reduce the industry's environmental footprint and facilitate long-term environmental and economical sustainability.

The pork industry's past, current and prospective environmental research and policy outcomes are outlined in the following section.

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<sup>14</sup> While Denmark is covered by the multi country, multi sector EU Emission Trading Scheme, the scheme itself does not include agriculture.

## 6.1. Past, current and prospective industry R & D investments and activities

Australia's pork industry has been proactively funding environmental research for well over 25 years including research into greenhouse gas mitigation and on-site bioenergy.<sup>15</sup> This research helped facilitate the construction of Australia's first on farm anaerobic digester in 1989 at Berrybank Piggery. Berrybank is still generating heat and power for use on site and exporting electricity back into the grid. (Unfortunately, biogas capture and use is yet to be widely adopted across the industry due to the poor return on investment faced by pig producers, which has been exacerbated by low cost of coal fired electricity).

More recent APL funded projects in this field include:

- Renewable energy industry development report on technical, economic and financial implications of using piggery waste to generate electricity (2004).
- Performance of a covered lagoon digester– effectiveness of sludge recirculation to optimise performance and manage sludge (2006).
- Demonstration of uncovered and permeable covered lagoons with high loading rates (2008).
- Anaerobic digestion of deep-litter bedding (2007).

In addition, since 2007 APL and pork industry partners have been the leading financial co-contributors to DAFF's *Methane to Market (M2M) in Agriculture* program, which has led to the following projects being jointly funded:

- Anaerobic digestion of livestock wastes (started July 2008)
- M2M in agriculture project: Assessing the performance of lagoons and covered anaerobic lagoon digesters (started January 2008).
- M2M in agriculture project: Retro-fitting floating covers with biogas flaring at a 700 sow piggery (started June 2008)
- M2M in agriculture project: Use of biogas for shed heating (calls for tenders underway)

Apart from bioenergy, pork industry research has focused on:

- Sustainable utilisation of manure and effluent in cropping, with specific projects around:
  - Crop yields under differing manure application and utilisation regimes;
  - Phosphorous mobility in soils;
  - Nitrate leaching in soils;
  - Salinity management;
  - Pathogen risk minimisation; and
  - Ammonia volatilisation during land application
- Minimising nutrients in manure through diet formulation, e.g. low protein diets and use of phytase to minimise phosphorous wastage;
- Effluent treatment approaches to remove nutrients e.g. overland flow and biological nutrient removal;
- Odour emission quantification and mitigation;

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<sup>15</sup> For example: Callander & Barford (1983) *Improved anaerobic digestion of pig manure through increased retention of substrate and bacterial solids*, J of Biotechnology Letters, 5, 3, 147-152

- Sustainable disposal of pig mortalities; and
- Environmental Management Systems (EMS) and audit tools.

APL's current industry R & D investments are in activities designed to reduce greenhouse gas emissions. These activities seek to:

- Commercialise low cost covered lagoon digesters that are cost effective for conventional pig producers;
- Develop auditable Best Management Practices that minimise methane and nitrous oxide emissions from piggery waste management and production systems;
- Commercialise on-farm bioenergy technology, which could effectively halve the emissions from conventional pig production systems;
- Minimise nitrous oxide emissions from land application of manures and effluent;
- Determine nitrous oxide emission from deep-litter sheds including a literature review of data and methodologies by the Queensland Department of Primary Industries & Fisheries intensive livestock group; and
- Develop a pork Life Cycle Assessment (LCA).

Successful adoption of these technologies and the resulting reduction of greenhouse gas emissions at pork farming businesses will result in improved energy efficiency, lower cost of production and improved profitability. Overall, these activities will focus on increasing pork producers' efficiency and economic competitiveness.

## **6.2. Information gaps and industry research strategy**

A key information gap for the pork industry is the amount of nitrous oxide (N<sub>2</sub>O) emitted from deep-litter pig sheds and waste management systems. APL is committed to obtaining better data on nitrous oxide emissions but understands that the complexity of this task is significant. APL's previous experience with odour emissions has shown that millions of dollars can be spent without scientifically robust answers being produced.

In addition, key information gaps remain around bioenergy including performance of lagoons as well as production systems in differing climates and the lack of experience among technology providers to build, commission and operate biogas capture systems.

Significant progress has been made towards commercialisation of on-farm methane capture and use via the Federal Government's Methane to Markets in Agriculture Program, to which APL is the largest financial co-contributor. However, further R & D work is required to make these technologies truly commercial, for example: a wider demonstration of the technology, particularly of the proposed sludge management techniques, developing lower cost digesters for smaller sites, and technologies better able to digest deep-litter bedding. Additionally, a critical mass needs to be developed to reduce construction and operating costs. Equally important is the extension work to make information available to pork producers, their consultants and technology providers. More details can be found in the joint RDC submission "Methane Capture and Use" provided in 2008 to the Australia's Farming Future Climate Change Research Program.

APL is also working collaboratively with the joint Rural RDC efforts to develop Life Cycle Assessment for Agricultural Industries (coordinated by the Rural Industries Research and

Development Corporation (RIRDC)). APL is contributing financially to this program to develop appropriate methodologies and to use pork as a case study to demonstrate how LCA can be used to consider the life cycle implications of bioenergy and nutrient recycling. APL is supporting RIRDC's LCA submission to the Australia's Farming Future Climate Change Research program.

APL aims to use LCA outputs, expected in late 2009, to better understand the implications of different production systems (i.e. deep-litter versus conventional), diets, and waste management options within a life cycle context. APL believes this data is critical for the pork industry to enable informed decisions (including long-term capital investments, R & D strategy and policy developments) with regards to pork production within a carbon constrained economy. Robust data such as this will be required to develop emission factors for pork production if agriculture enters the CPRS in 2015.

### **6.3. Climate change adaptation and offsets in agriculture**

The relatively high emission levels originating from a point of source makes industries such as pork potential targets for additional regulatory obligations and costs in the future. Existing on-farm technology offers a chance for the industry to make substantial investments in dealing with environmental challenges and to reduce industry emissions in the run-up to inclusion of agriculture in the CPRS in 2015, provided (financial or policy) incentives are available to encourage this transition. It is critical that these industries are encouraged early to proactively reduce emissions.

There is significant benefit to identify low hanging fruit such as management of methane from effluent storage ponds within intensive livestock industries. An example of research that offers the government a return on investment is covered lagoon digesters at piggeries, feedlots and intensive dairies. These could mitigate methane emission at costs of less than \$10 per tonne CO<sub>2</sub>-eq.<sup>16</sup> Also, the potential revenue that could be earned in the short term could enable producers to reduce the impact of higher fuel and energy costs.

Presently, there are poor economic returns for producers from such investments; these are insufficient to economically justify such investments despite the large component of public good. Therefore, to realise commercialisation of emission mitigation technologies incentives need to be provided to make these investments and to encourage good environmental performance and climate change adaptation in the industry.

## **7. The role of government - augmenting the shift towards sustainable production practices and promoting research, extension and training**

Under consideration of past and current industry research, and with a focus on sustaining industry competitiveness, additional government efforts are required to encourage continued industry climate change adaptation and environmental performance. These efforts are described in the following section.

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<sup>16</sup> For more details see "Methane Capture and Use in Agriculture" submission to the Australia's Farming Future Climate Change Research program.

## 7.1. Remove regulatory impediments

Environmental regulation is necessary to encourage individuals, business and industry from causing significant harm to the environment. Australia maintains one of the strictest regimes of environmental regulation in the world. The World Economic Forum's Global Competitiveness Report 2007-08 ranks Australia 16th out of 125 nations for the overall stringency of its environmental regulations.<sup>17</sup>

Significant cost pressure on pork farm businesses results from compliance with state government planning regulations, which often create costly impediments for piggery development such as mandatory buffer zones for odour and noise; and the state based Environmental Protection Regulation, which leads to additional regulatory burdens and payment of annual fees. These environmental fees show considerable variation when compared on state-by-state basis, adding to the high cost of production and creating a competitive disadvantage for producers in states with higher environmental fees.

### Box 2 Examples of environmental fees for piggeries (QLD versus Vic)

From 1 January 2009, the Queensland Environmental Protection Agency (EPA) is asking pig farmers with more than 8,000 Standard Pig Units (SPU) to pay an annual fee of \$4,300; this compares to a fee of \$500 until 2008. Smaller producers with 21 up to 3,500 SPU's did not have to pay any fee until December 2008, however, they now face annual fees of \$500 up to \$2,700. Critically, industry efforts in negotiating rewards for good environmental performers, which have invested into reducing their environmental footprint, are yet to be recognised by the QLD government via a proposed scheme of fee discounts.

This outrageous fee increase creates a significant competitive disadvantage compared to Victorian pig farmers for example, which do not have to pay such environmental fees at all.

Environmental regulation for air, noise, waste and water varies significantly across jurisdictions and states. This can create major impediments for piggery development as modern day pork production enterprises extend beyond council and state borders in an attempt to mitigate operational risk by operating in different geographic areas. This risk management tool will become increasingly important as the industry continues to rationalise and consolidate. Therefore, harmonisation of environmental regulation on a national level would benefit integrated industries such as the pork industry with enterprises extending across borders.

Environmental regulation often does not take into account existing industry best management practices (BMP), e.g. on-farm audits and management systems, and thus unnecessary duplicating regulation and increasing costs without improving the environmental footprint. In addition, site-specific mitigation measures applied by producers in an attempt to reduce their environmental footprint are often not recognised by environmental regulation. Critically, old development approvals can even have conditions that contradict industry BMP and are not subject to regular review and difficult to alter. Mindful planning in compliance with government development regulations and an industry co-regulation approach can lead to improved environmental outcomes at least cost for pork producers.

<sup>17</sup> Available at: <http://www.weforum.org/en/initiatives/gcp/Global%20Competitiveness%20Report/index.htm>



According to the Productivity Commission Review of Regulatory Burdens on Business – Primary Sector 2007, environmental regulation is a key regulatory requirement for agricultural producers at all stages of primary production. Differences in regulation between states, unnecessary double regulation and interference with other regulation contribute to the regulatory burden on businesses and can significantly increase cost of compliance. The Commonwealth is currently considering its response to the report.

## **7.2. Remove government assistance for grain based biofuels**

Australia has experienced severe drought conditions since 2003. The ongoing drought conditions across Australia have highlighted the importance of security of feedgrain supply to the livestock industries. Adverse feedgrain supply conditions are further exacerbated by state and federal government assistance for the upcoming Australian biofuel industry, which will add further pressure to the feed grain market. Total federal government financial assistance amounted to \$95 million in 2006-07. Critically, mandating ethanol content in fuel and encouraging grain-based biofuel production diverts grain from human food production, creates a food versus fuel relationship and eventually increases food prices for consumers.

Significantly, from an intensive livestock industry perspective, additional demand for grain distorts local markets and artificially inflates feedgrain prices. Coupled with this is the increasing demand for food and international policy support for biofuels, causing world grain prices to trend upward. World grain prices are predicted to have reached a new benchmark on a comparably higher level than 2005-06. This is a significant threat for the viability of highly grain dependant intensive livestock industries such as the Australian pork industry. The role of ethanol production in these price increases is significant with the International Food Policy Research Institute in Washington stating that it is responsible for between 25-33 per cent of global commodity price increases during 2000-2006.<sup>18</sup>

In Australia, the major biofuel policy at the national level is a 350 million litre non-binding target by 2010, i.e. one per cent of current fuel production. On the other hand, state governments (WA, QLD) in a solo effort have proposed to, or already have implemented (NSW), biofuel content mandates that impose minimum content of biofuels to be blended in commercial fuels, ranging from 2-10 per cent of total petrol consumed. This effectively leads to an Australia wide mandate for biofuels and is a direct result of uncoordinated biofuel strategies and policies across federal and state governments. More recently, the NSW Government in December 2008 proposed to further increase policy assistance for biofuels in form of an expanded ethanol mandate in NSW from presently two per cent to 6 per cent by 2010 and 10 per cent by 2011.

Uncoordinated biofuel strategies and policies across federal and state governments create unnecessary regulatory burdens and financial impediments for feedgrain dependant intensive livestock industries, while the environmental benefits of such a policy remain questionable.

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<sup>18</sup> IFPRI, High Food Prices - The What, Who, and How of Proposed Policy Actions, available at <http://www.ifpri.org/pubs/ib/foodprices.asp>

In addition, the Governments' policy position in the CPRS White Paper to "zero rate" emissions from grain derived biofuels under the CPRS, despite the significant emissions from grain production and biofuel production processes, effectively is another form of government assistance for the biofuel industry. This policy signal will hold up development of more sustainable biofuels with a smaller environmental footprint and increases pressure on grain dependant industries such as the pork industry. Instead, APL recommends redirecting incentives into second-generation biofuels that are economically viable.

### **7.3. Develop drought assistance to improve on-farm preparedness for climate change**

ABARE's report on issues and challenges for agriculture with adaptation to climate change<sup>19</sup> found, that *"adaptation to climate variability has been an ongoing necessity for the agricultural sector, particularly in countries such as Australia where extreme climatic conditions are common. Existing strategies to manage climate variability present opportunities for meeting the challenges of future climate change."* As previously outlined in this document the Australian pork industry has a proactive approach to environmental sustainability issues and has a history of significant investments into R & D projects to address these issues.

However, adaptation to climate change means a major challenge for the pork industry, particularly in the face of ongoing drought conditions, which significantly restrict the industry's adaptive capacity and ability to invest into climate change adaptation technologies. As the Senate Rural and Regional Affairs and Transport Committee's interim report *Climate Change and the Australian Agricultural Sector*<sup>20</sup> states, *"the current drought has severely restricted the ability of agriculture to finance the change and adaptation to climate change; future drought policy should be aimed at assisting the agricultural sector to adjust to climate change and prepare for extreme climatic conditions."*

Australian pork producers are severely impacted by drought; yet in the last drought, most were unable to access assistance due to Exceptional Circumstances (EC) eligibility criteria. Survey results show, that most pork producers do not even see themselves as being eligible for current forms of drought assistance with approximately 5 per cent of producers accessing some component of the drought assistance suite of programs offered by federal and state governments.<sup>21</sup> More significantly, some state assistance measures such as freight subsidies effectively increase production costs and create perverse outcomes for pork producers. This is a result of the differing production systems between extensive and intensive farming and thus piggeries are beyond the visual perception of the public. Industry data shows that existing EC criteria has not kept pace with development of modern day farming businesses, reducing the uptake of government drought support by pork producers considerably.

Current EC assistance is essentially designed on the requirements of broad acre farmers and effectively restricts pork producers' access to drought assistance. The drought assistance

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<sup>19</sup> ABARE (2007), *Adapting to climate change - issues and challenges in the agriculture sector*, available at [http://www.abareconomics.com/interactive/ac\\_mar07/hm/a2.htm](http://www.abareconomics.com/interactive/ac_mar07/hm/a2.htm)

<sup>20</sup> Available at [http://www.aph.gov.au/Senate/committee/rrat\\_ctte/climate\\_change/interim-report/index.htm](http://www.aph.gov.au/Senate/committee/rrat_ctte/climate_change/interim-report/index.htm)

<sup>21</sup> Warwick Yates & Associated, 2008, *Drought Assistance Availability and Impacts on the Australian Pig Industry*, prepared for Australian Pork Limited

framework fails to cater for the inherent differences in size and type of pork production systems; risk management strategies employed by pork producers to cope with drought; the fact that pork production is a cash-flow intensive industry with low profit margins that will continue to produce to service debt given its high capital outlay. Critically pork producers cannot simply de-stock to reduce production cost because the re-entry costs and timeframes are prohibitive and regaining market access and contracts is difficult if not impossible.

In managing drought impacts on-farm, the pork industry has developed a self-help approach: it has made significant investments in improving on-farm drought preparedness, risk management and self-reliance. Drought has created an opportunity for producers to tighten production and focus on improving farm efficiency. However, existing EC criteria and assessment procedures have tended to discriminate against pork producers and therefore put them at a disadvantage to other livestock and grain producing industries.

We look forward to the findings and report of the PC Inquiry into Government Drought Support, which was handed to the Government on 27 February 2009. However, we note that the Senate Rural and Regional Affairs and Transport Committee in its recently tabled interim report Climate Change and the Australian Agricultural Sector, in particular looking into the adequacy of existing drought assistance and exceptional circumstances programs to cope with long-term climatic changes, made no recommendations and acknowledged that there is just so much work to do. One of the committee's findings, however, was that the current drought has severely restricted the ability of agriculture to finance the change and adaptation to climate change; future drought policy should be aimed at assisting the agricultural sector to adjust to climate change and prepare for extreme climatic conditions.

#### **7.4. Promote R & D into climate change**

For agriculture to be included in the CPRS from 2015, considerable government funding assistance is required to target existing information gaps as well as develop and facilitate uptake of mitigation measures. The most recent ABARE report<sup>22</sup> into CPRS implications for agriculture stated, *"further research is required in Australia to improve and develop efficient and effective mitigation opportunities in agriculture. The development of these technologies, however, will require a concerted effort and increased funding for research and development."* Failure to create a comprehensive understanding of the impact of climate change on agriculture and the role of the various sectors, could lead to perverse outcomes through implementation of the CPRS and put at risk long-term sustainability of Australia's food production and related export industries.

##### **7.4.1. Provide additional funding for industry R & D projects**

As previously outlined in this document, the pork industry has a long-term commitment to R & D addressing environmental challenges. However, APL notes that long-term adaptation to climate change requires increased long-term investment into areas such as emission measurement technologies, data modelling capabilities and profound knowledge of the industry life cycle.

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<sup>22</sup> ABARE, February 2009, Agriculture and the CPRS: economic issues and implications, available at: [www.abareconomics.com/publications\\_html/ins/insights\\_09/a2.pdf](http://www.abareconomics.com/publications_html/ins/insights_09/a2.pdf)

The pork industry is currently undertaking a life cycle assessment (LCA), which is expected to deliver a better understanding of the implications of different production systems, diets, and waste management options within a life cycle context. The results from this project are expected in late 2009. Also of critical and pressing concern is the need for the development of baseline data and appropriate and consistent methodologies for the consistent emission reporting and life cycle assessment across agricultural industries.

APL's previous research efforts in anaerobic digestion and bioenergy have been described in Section 6.1. Presently, the key information gaps for the pork industry and future areas of work in the climate change field relate to:

- life cycle assessment and the amount of methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions from deep-litter pig sheds and waste management systems;
- emission data collection and analysis;
- assessment of activity level energy use to determine energy intensity of different activities/ production systems in different climatic environments; and
- impact on costs of production and our ability to compete against imports.

APL is committed to obtaining better data on nitrous oxide emissions but understands that the complexity of this task is significant. We agree with the National Farmers Federation that a coordinated suit of research & development and extension for both livestock and plant-based industries to understand sources of nitrous oxide and improve management and mitigation options is vital.

APL also emphasizes the need for additional research and extension in climate change related areas to increase on-farm preparedness and further reduce the environmental footprint. Suggested initiatives include:

- developing environmental management plans (EMP) for pig farms,
- performing environmental audits on farm,
- developing nutrient management plans (NMP) for pig farms,
- preparing laboratory analysis of farm effluents,
- promoting uptake of industry best management practices (BMP),
- collecting life cycle inventory data on nitrous oxide emissions,
- modifying pig housing systems in regard to climate change,
- using bioenergy to mitigate greenhouse gas emissions, and
- improving water sustainability.

It is also important that farmers and farm businesses have available user-friendly, reliable and up-to-date information specific to their location regarding climatic conditions and future climate variability. As suggested by the National Climate Change Research Strategy for Primary Industries (CCRSPI) in their submission to the Committee, co-ordinated investment is required to improve the understanding of climate change and to develop decision support tools for producers that translate climate data into commodity-specific information for improving productivity and profitability. This has also been a key

recommendation of the joint CSIRO/BOM analysis<sup>23</sup> undertaken in July 2008, which stated that *“there is a need for development of predictive modelling of climate change effects including:*

- *additional studies to more accurately identify the climate change information needs of different sectors of rural Australia;*
- *development of early warning and predictive systems for drought, allowing the timely recognition of exceptional events developing; and*
- *further research efforts into improved climate change projections, seasonal-to-interannual forecasts, and their relevance to decision-makers in different sectors and regions of rural Australia.*

To create world class innovation and maximise the resilience and adaptive capacity of agriculture long term government funding for agricultural R & D into climate change as well as development and extension of sustainable farming practices needs to be significantly increased and should be proportionally in line with the support given to geosequestration from coal fired power stations. Geosequestration - R & D has recently received some \$500 million in funding from the Federal Government. Agricultural emissions are equal to approximately 35 per cent of the emissions of the coal industry (National Greenhouse Gas Inventory 2006) and are potentially more easily remedied. A significant increase on top of the current available funding is required to address existing R & D gaps and identify areas of future work to successfully reduce the greenhouse gas emissions from Australian agriculture.

#### **7.4.2. Coordinate the suite of climate change R & D**

Considering the complexity of the issues and the short timeframe for the task, APL supports a nationally coordinated approach to climate change related research as suggested by NFF and CCRSPI.<sup>24</sup> A concerted approach to climate change R & D is also one of the key recommendations that came out of the latest ABARE modelling exercise.<sup>25</sup> This would facilitate knowledge transfer between different sectors, streamline the whole process and allocate Government and industry funds in the most efficient way.

#### **7.5. Develop a communication strategy for agriculture**

Raising awareness for, and increasing levels of sustainable farming practices needs to be an essential part of the government’s strategy to facilitate climate change adaptation of agriculture. As stated by ABARE<sup>26</sup>, *“it is also important that market barriers, such as information gaps concerning available technology and production practices, which may prevent the uptake of economically efficient mitigation technologies are addressed. If market barriers continue to prevent mitigation practices from being taken up, the CPRS will encourage higher levels of production losses to reduce emissions obligations than is economically efficient.”*

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<sup>23</sup> CSIRO, BOM July 2008, An assessment of the impact of climate change on the nature and frequency of exceptional climatic events, available at [http://www.daff.gov.au/agriculture-food/drought/national\\_review\\_of\\_drought\\_policy/climatic\\_assessment](http://www.daff.gov.au/agriculture-food/drought/national_review_of_drought_policy/climatic_assessment)

<sup>24</sup> CCRSPI submission to this inquiry

<sup>25</sup> ABARE, February 2009, Agriculture and the CPRS: economic issues and implications, available at: [www.abareconomics.com/publications\\_html/ins/insights\\_09/a2.pdf](http://www.abareconomics.com/publications_html/ins/insights_09/a2.pdf)

<sup>26</sup> ABARE, February 2009, Agriculture and the CPRS: economic issues and implications, available at: [www.abareconomics.com/publications\\_html/ins/insights\\_09/a2.pdf](http://www.abareconomics.com/publications_html/ins/insights_09/a2.pdf)

Therefore, pork producers need to be subject of joint APL & federal and state government communication programs to clarify pork producers' options to adapt to climate change and facilitate uptake of sustainable farming practices. This campaign is necessary to inform producers and educate them about low hanging fruit such as efficient use of farm inputs, waste reduction and improved pig diets to reduce their environmental footprint in a climate change environment. Communication programs, however, must be sophisticated in their design, with their development, delivery mechanism and information exchange specifically designed to target different size, form and production systems. For example, the few large integrated pork production businesses in Australia have a comprehensive understanding of business sustainability and effectively manage their production risk. In contrast, there are a large number of small to medium sized producers, which often lack a comprehensive understanding of risk management and long-term sustainable farming.

Raising awareness for, and increasing levels of sustainable farming practices needs to be an essential part of the government's strategy to facilitate climate change adaptation of agriculture. New research spending needs to be targeted towards better understanding what climate change will mean within Australia's landscapes and waterways, linking understandings of climate change to impacts on agricultural production systems.

## **8. Conclusion**

The Australian pork industry has undertaken a proactive approach to environmental sustainability and climate change over the years and has a history of significant investments into R & D in this area. Ongoing adaptation of the industry to economic challenges such as drought conditions and market distorting import competition over time has significantly changed the way pigs are produced in Australia and contributed to development of the present structure of the industry. More significantly, economic challenges such as rising input costs without a corresponding increase in pork prices reduce the domestic and international competitiveness of this cash flow intensive low margin industry. This is further exacerbated by inconsistency of public policies and lack of harmonisation in regulation across states.

Given the severe impacts of climate change on Australian agriculture and the pork industry in particular as well as the tight timeframe behind the government work program for coverage of agricultural emissions under the CPRS from 2015, it is critical that government undertake additional efforts to encourage early adaptation. These efforts include additional financial assistance for climate change research and adaptation and, even more important, removal of regulatory burdens and impediments for producers that limit their adaptive capacity to respond to climate change. The governments' role in augmenting the shift towards sustainable production practices and promoting research, extension and training is vital for securing superior outcomes for both adaptive capacity and global competitiveness of Australian agriculture in a climate change environment.

APL's key recommendations for government efforts that need to be undertaken to maintain a long-term sustainable pork industry, both economically and environmentally, comprise:

### **1) Provide additional funding of climate change related industry R & D**

There is a need for additional research and extension to address information gaps in life cycle assessment; the amount of methane and nitrous oxide emissions from

different pig farming systems; measures to improve on-farm preparedness; measuring emissions and data collection procedures; and development of commodity specific decision support frameworks and tools to better inform farmers and enable improved productivity and profitability, as well as further reduce their environmental footprint.

**II) Coordinate the suite of climate change R & D**

A nationally coordinated approach to climate change related research is necessary to facilitate knowledge transfer between different sectors, streamline the whole process and allocate government and industry funds in the most efficient way.

**III) Develop a communication strategy for agriculture**

Pork producers need to be subject of joint APL & federal and state government communication programs to clarify pork producers' options to adapt to climate change and facilitate uptake of sustainable farming practices. Raising awareness for, and increasing levels of sustainable farming practices needs to be an essential part of the government's strategy to facilitate climate change adaptation of agriculture.

**IV) Remove government assistance for biofuels**

Mandating ethanol content in fuel and encouraging grain-based biofuel production diverts grain from human food production, creates a food versus fuel relationship and eventually increases food prices for consumers. Incentives must be redirected into second-generation biofuels that are economically viable.

**V) Develop drought assistance to facilitate on-farm preparedness for climate change**

Future drought policy should be aimed at assisting the agricultural sector to adjust to climate change and prepare for extreme climatic conditions.

**VI) Remove regulatory impediments**

Differences in regulation between states, unnecessary double regulation and interference with other regulation contribute to the regulatory burden on businesses and can significantly increase cost of compliance for pork producers.

