AMPC

AUSTRALIAN MEAT PROCESSOR CORPORATION

Emissions Reduction Fund Briefing Paper

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Executive Summary

The Australian Government's proposed Emissions Reduction Fund (ERF) intends to create incentives for eligible greenhouse gas (GHG) abatement projects. The ERF provides a framework where GHG emissions reductions are credited as Australian Carbon Credit Units (ACCUs) and are purchased by the government through a contract for abatement delivery with the Clean Energy Regulator. Emissions reductions will be purchased at lowest cost as determined by a competitive 'reverse auction' bidding process.

Participation will be through a 'menu' of approved ERF methodologies designed for broad application to encourage business participation. Each method will set out specific eligibility requirements for project participation, over and above the 'newness' requirement which states that a project must not commence implementation prior to being registered with the Regulator.

The design of the ERF was outlined in the Emissions Reduction Fund White Paper and on 24 November 2014 the Carbon Credits (Carbon Farming Initiative) Amendment Bill 2014 was passed by Parliament. The Bill will take effect once proclaimed. This will establish the ERF.

Potential ERF participation by Australian red meat processing facilities will depend in part on the potential size and cost of the emissions reduction opportunities, which vary from site-to-site. The main sources of emissions from red meat processing facilities originate from waste water management, electricity consumption and coal/gas/oil consumption for generating process heat. In order to provide context to the range of opportunities available to processing facilities, AMPC commissioned research into the opportunities that may be presented under a reference 'typical' scenario; a red meat processing facility processing 625 cattle per day, using natural gas for process heat and having a deep water anaerobic lagoon for waste water treatment may. It was assumed that over a 12 month period this facility may:

- use approximately 84,000 GJ of process heat, with emissions of 4,310 tonnes of carbon dioxide equivalent per annum (tCO_2e p.a.) for natural gas or 7,430 tCO_2e if coal is used
- use 11,900 MWh of electricity from the grid, with emissions of 9,750 tCO_2e p.a.
- generate waste water with 11,160 tonnes of chemical oxygen demand, and emissions of up to 32,400 tCO_2e p.a.
- potentially dispose of 5,700 tonnes of solid waste (paunch and DAF sludge), with corresponding emissions potential of 1,266 tCO_2e (spread over many years)
- have minor emissions associated with back up diesel generator use and transport.

A preliminary assessment of potential ERF projects found the highest potential GHG abatement arising from waste water treatment projects (involving methane capture and reuse/destruction), followed by fuel switching (particularly in the case of biogas for process heat or cogeneration), and energy efficiency (both heat and electricity). Diversion of waste from landfill, soil carbon, and livestock feed supplements are likely to have limited application to red meat processing facilities because of the relatively low abatement potential.

Presently there no approved ERF method statements that would allow participation in the ERF by the red meat processing sector. However, there are two relevant draft methodologies that have been released for public comment; 1) Domestic, Commercial and Industrial Wastewater; and 2) Industrial Fuel and Energy Efficiency. These methodologies relate to treating industrial, domestic and commercial wastewater in an engineered biodigester and industrial energy efficiency, including fuel switching with biogas. At the time of preparing this briefing paper, the method statements were in varying stages of finalisation prior to finalisation. Part of the work undertaken to date has been to ensure that these emissions reduction project methodologies are applicable to red meat processing facilities.

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1 Introduction

The ERF intends to create incentives for eligible greenhouse gas (GHG) abatement projects. However, in order to participate in the ERF, abatement projects will need to address ERF eligibility issues, in addition to having an ERF Method Statement for project carbon accounting.

The outcome of this project will be an approved ERF Method Statement suitable for abattoirs to use for the registration of abatement projects. The process will save time, money and improve the likelihood of a successful result.

The six key objectives to be delivered under this project include:

1. Review key ERF documents and potential Red Meat Processing Industry abatement options and prepare a briefing paper for the AMPC
2. Engage with AMPC to select the most promising abatement activity for ERF participation
3. Engage with Department of Environment (DoE) and Emissions Reduction Assurance Committee (ERAC) to build a collaborative effort around methodology development
4. Prepare a method statement proposal for DoE and ERAC
5. Liaise with DoE and ERAC to deliver an approved methodology suitable for Industry use
6. Prepare a fact sheet and conference presentation to advise Industry of the resulting ERF opportunity.

This briefing paper meets the first key project objective.

2 Emissions Reduction Fund

The Government's Direct Action Plan and associated Emissions Reduction Fund (ERF) creates incentives for eligible greenhouse gas abatement projects. The Red Meat Processing Industry was previously unable to participate in the Carbon Farming Initiative (CFI) as it was a liable sector under the Carbon Pricing Mechanism (CPM). The repeal of the CPM has removed this barrier to participation as the CFI transitions into the ERF.

The ERF provides a framework where emissions reductions are credited as Australian Carbon Credit Units (ACCUs) and are purchased by the government through a contract for abatement delivery with the Clean Energy Regulator.

2.1 Crediting Emissions Reductions

The ERF will credit 'new' emissions reduction activities that deliver genuine abatement. In order to be considered new a project must not have been implemented before it has been registered with the Clean Energy Regulator (CER). However, a new project can include the expansion or upgrade of an existing activity.

Participation in the ERF will be through a 'menu' of approved ERF methods designed for broad application to encourage business participation. There are two kinds of methods: 'activity methods', which are like CFI methodologies and 'facility methods', which aggregate emissions reductions from multiple activities at large facilities and rely on National Greenhouse and Energy Reporting Scheme (NGERS) data.

In addition to approximately 30 existing CFI methodologies, the Government has created technical working groups to develop new methods for the ERF. ERF methods will operate within an expanded and streamlined version of the CFI. They will contain requirements for establishing additionality (beyond business as usual emissions reductions) reporting and verification, the process for setting baseline emissions and the process for calculating project emissions. NGERS estimation approaches will be used where possible and applicable.

The CER will issue ACCUs once emission reductions generated under an approved method have occurred and are reported, audited and verified as per the requirements of the relevant method. The standard ERF crediting period will be seven years, which is consistent with CFI (note that the crediting period is different to contract period). There will be flexibility in reporting periods and audit approaches.

2.2 Purchasing Emissions Reductions

The ERF will purchase emissions reductions at lowest cost as determined by a competitive bidding process. CER will enter into contracts to purchase emissions reductions from successful bid projects. Auctions will rank projects according to their costs as determined by a sealed bid that specifies a price per tonne of emissions reduction. The price paid by CER to a project is the price bid at auction by the project.

Pre-qualification to the ERF auction involves an assessment by the CER that the proponent has the skills and legal right to undertake the project, that the project is covered by an approved method, is commercially ready, and that the amount of ACCUs to be delivered by the project has been correctly estimated. The Government will purchase 80 per cent of emissions reductions offered at a price below the benchmark price (the maximum price CER will pay). The benchmark price is set in advance of each auction, but will not generally be made known to auction participants. Once a project is successful at auction it cannot be rebid into a later auction.

The minimum bid size is 2,000 tonnes of carbon dioxide equivalent (tCO_2e) of average annual abatement over the life of the contract, adjustable in the future by CER. The Government will have the discretion to enter out of auction contracts for projects that deliver above 250,000 t CO_2e per annum (tCO_2e pa). Four auctions are scheduled for the first year. There are a minimum number of required registered bidders and a minimum amount of required emissions reductions for an auction to occur.

Contracts will set out the Government's obligation to pay for emissions reduction and the participant's obligation for delivery according to a schedule of emissions reductions and price to be paid. Projects will only have one contract period of payment from Government, and the proposed standard contract term is seven years.

Participants must agree to be bound by the standard project contract as a condition of auction participation including 'make good' provisions.[1] Contracts will be available to review in advance of the first auction. Payment will be made for all emissions reductions as and when they occur (no upfront payment).

2.3 Administration and Governance

The Government will make ERF design decisions and make rules to guide operations, including method setting and emissions baselines that apply under the Safeguard Mechanism. The Minister will approve the legislative framework and will also have the ability to delegate power for method creation to other persons, such as the secretary of the Department of the Environment. The Department will continue to advise the Minister and implement Government policy, in addition to supporting the development of ERF methods and the provision of secretariat support to ERAC.

The Clean Energy Regulator will be responsible for administering and applying the rules of the ERF and safeguard mechanism. This will include project registration, auction administration, ACCU issuance for certified emissions reductions, contracting and payment for emissions reductions delivery.

The CER will publish a range of information including: weighted average price awarded to successful projects after each auction; an Emissions Reduction Fund Register (details of successful ERF contracts but not price); and aggregated annual information on successful bid volume, funding commitments, ACCUs purchased and funds expended.

A new Emissions Reduction Assurance Committee (ERAC) will replace and expand the Domestic Offsets Integrity Committee (DOIC). ERAC will review ERF methods at least once every four years and will play a key role in developing and approving methods.

Total funding of $2.55 billion will be provided under the ERF. Future funding will be considered in future budgets. Eligible Australian Carbon Credit Units issued under the Carbon Farming Initiative Act 2011 will be GST free. Payments received from the sale of ACCUs under the ERF will be income for taxation purposes.

[1] The exposure draft Carbon Abatement Contract and discussion paper released for public consultation is available at http://www.cleanenergyregulator.gov.au/About-us/news-and-updates/Pages/2014-06/27-June-2014-Exposure-draft-Carbon-Abatement-Contract-and-discussion-paper-released-for-public-consultation.aspx.

3 Overview of GHG emissions from red meat processing facilities

The inputs and outputs from a 'typical' beef processing plant are presented in Figure 1. A 'typical' beef plant is considered to be a plant processing 625 head per day (hpd) with associated rendering, operating for 250 days per annum and producing 150 tonnes hot standard carcass weight (tHSCW) per day.[2] On a tHSCW basis, a typical plant represents approximately 1.5 per cent of total Australian HSCW beef production.

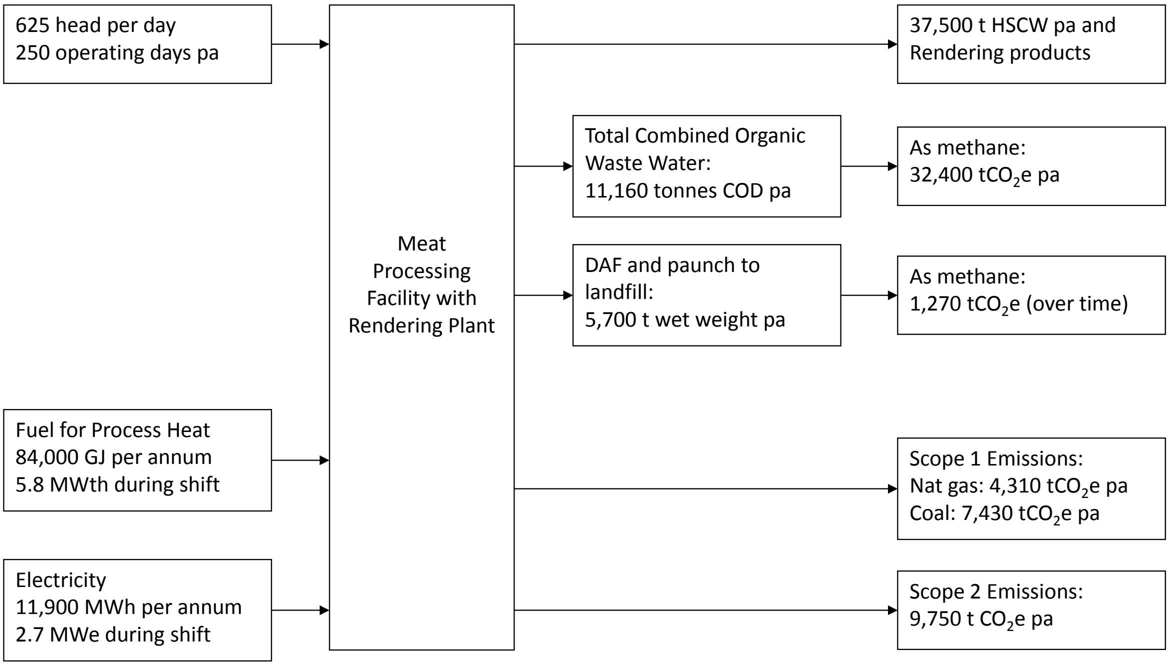

Figure 1: Operation of a red meat processing facility showing generic inputs, outputs and energy usage for a 625 cattle per day facility

Energy usage and associated greenhouse gas (GHG) emissions are also shown in Figure 1 and have been derived from published data[3] with emission intensities used from the NGER Determination.[4] Emissions from process heat are shown for the usage of natural gas and also coal as the source fuel. The emissions intensity of 0.82 tCO_2e per MWh (as for Queensland) was used for electricity emissions. Landfill emissions are total potential Scope 1 fugitive emissions associated with the most commonly land filled meat processing facility wastes of dissolved air flotation (DAF) sludge and paunch waste. Usage of fuel for other purposes (for example site based transport, emergency gensets, isolated equipment) is relatively minor for most facilities.

3.1 Energy usage

A sample survey of the AMPC membership in 2012 found that approximately two thirds of respondent's energy usage was for process heat requirements, nearly one third for electricity for plant operations and a minor amount (1 per cent) for diesel as transport fuel and stationary energy in some cases.[5]

[2] AMPC Report A.ENV.0090, 'Environmental Data Analysis', July 2011.

[3] MLA/AMPC Report A.ENV.0131, 'Energy and Nutrient analysis on Individual Waste Streams', Aug 2012.

[4] National Greenhouse and Energy Reporting (Measurement) Determination 2008, National Greenhouse and Energy Reporting (Measurement) Amendment Determination 2013 (No. 1), accessed at www.comlaw.gov.au/Details/F2013C00661, July 2014.

[5] AMPC / AMIC survey, 'Carbon Tax Modelling Survey Questionnaire'2012, unpublished.

The main boiler house generates steam (for use in areas such as rendering, blood processing, tallow processing, cleaning and to make hot water). Processing plants with a rendering facility may generate an excess of hot or warm water with this heat being dumped to atmosphere via evaporative cooling towers or air cooling systems. Figure 2 below presents typical heat consumption in a facility based on the percentage of 84,000 GJ pa process heat fuel use.

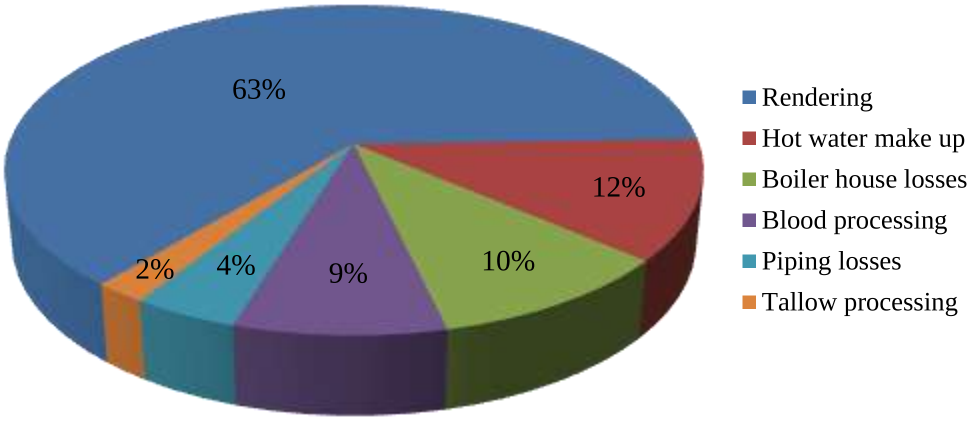

Figure 2: Heat consumption in a typical plant as a percentage of total 84,000 GJ pa process heat fuel usage[6]

A typical facility is expected to generate approximately two thirds of its hot water requirements via 'waste' heat recovery systems, with the balance obtained via make-up from the steam system. Red meat processing facilities generate process heat from a range of sources including natural gas, coal, LPG, and biomass. Half of respondents to the 2012 AMPC membership survey[7] (and more than half on a HSWC basis) reported using coal fired boilers for process heat requirements. In the case of a 625 hpd plant, around would be 4,310 tCO_2e emissions if natural gas was used and 7,430 tCO_2e emissions if coal with a higher emissions intensity was used as fuel. (Note it is likely that more coal is used given the lower efficiency of coal boilers over natural gas).

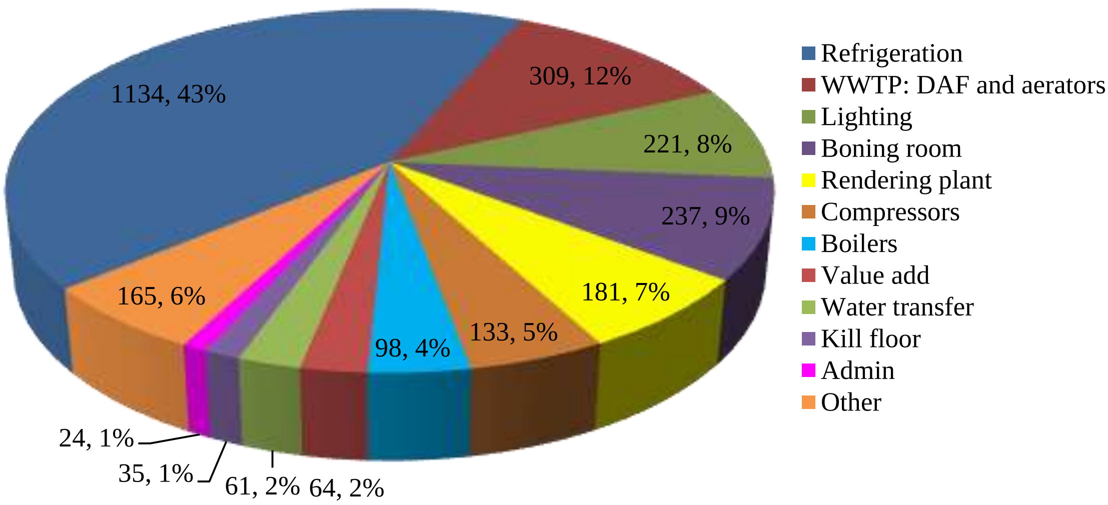

Figure 3: Electricity consumption in kW and percentage contribution to operational power draw[8]

[6] AMPC Report A.ENV.0090, 'Environmental Data Analysis', July 2011.

[7] AMPC / AMIC survey, 'Carbon Tax Modelling Survey Questionnaire'2012, unpublished.

[8] AMPC Report A.ENV.0090, 'Environmental Data Analysis', July 2011.

Figure 3 presents electricity demand for various sections of a typical red meat processing facility during operational hours, which contribute to a total load of 2,661 kW. Refrigeration is the main power load during shifts and also for maintaining storage temperatures during out of hours, contributing to around 45 per cent of all electricity usage over the space of a year.

From an equipment perspective, pumps associated with waste water treatment contribute to approximately 12 per cent of site wide electricity use. Lighting is also a significant user of electricity, accounting for eight per cent of total electricity use. The GHG emission from annual electricity usage of 11,900 MWh is 9,750 tCO2e.

3.2 Waste generation

The majority of waste generation at a red meat processing facility is treated through its wastewater treatment system. The total flow of wastewater material was scaled to approximately 2,500 kL/day[7] with the percentage contribution of the total volume of waste presented in the last column of Table 1 below. Total chemical oxygen demand (COD) in the waste water was estimated to be approximately 11,160 tonnes COD from total combined organic waste water streams. The methane generation potential as a percentage of wastewater streams is also presented in Table 1 below. Total methane generation potential was scaled to 9,860 m^3 methane per day[9] which is equivalent to GHG emissions of 130 tCO_2e per day or 32,400 tCO_2e pa.[10]

Table 1: Estimated methane potential as a percentage contribution from each wastewater stream

Waste Stream	Description	Methane Potential (% total methane)	Volume (% total volume)
Cattle wash	Water used to wash the cattle prior to slaughtering.	4%	34%
Paunch Liquid	Liquid fraction of the paunch/tripe mixture after screening through rotating drum filter.	18%	12%
Paunch, Tripe, Green Wash	Paunch mixture which comes from the opened stomach contents of the cattle mixed with washing water. Combined with Tripe Wash.	29%	13%
Kill floor	Combined wastewater from the slaughter room floor – does not include sterilizer water which is captured separately.	5%	17%
Tripe Wash	The Tripe wash water from the bible washing machine.	6%	2%
Saveall Effluent	Combined rendering and boning room wastewater after solids removed in the DAF.	17%	14%
Rendering	Combined bone polish stick water and blood removed from pre-rendering treatment (bone squeeze) from the new rendering section of the plant.	21%	7%

[9] MLA/AMPC Report A.ENV.0131, 'Energy and Nutrient analysis on Individual Waste Streams', Aug 2012.

[10] Note this is calculated as the methane potential in the waste water and the emissions released as if processed in an engineered biodigester and then vented to atmosphere.

Solid waste materials primarily include paunch and DAF sludge. Other sources of solid waste are solids from the saveall bin and kill floor bin however these amounts are relatively minor. Many sites compost these materials, or spread these materials directly on land. However there are instances where this material (or a portion thereof) is landfilled. Approximately 5,700 tonnes of solid waste (wet weight) can be generated at a 625 hpd facility. If these materials were landfilled, approximately 1,270 tCO_2e would be released from the landfill. However these emissions would be released over many years as the materials slowly decompose under anaerobic conditions.

3.3 Summary: sources of GHG emissions from red meat processing facilities

A summary of the annual Scope 1 and 2 GHG emissions from a typical 625 hpd red meat processing facility is presented in Figure 4. Annual emissions are calculated to be 47,820 tCO_2e if natural gas is used for process heat and slightly higher at 50,940 tCO_2e if coal is the process heat fuel. Wastewater treatment is the largest source of emissions accounting for up to 32,400 tCO_2e of Scope 1 emissions which is 64 – 68 per cent of total emissions (the difference depends on the source of fuel for process heat).

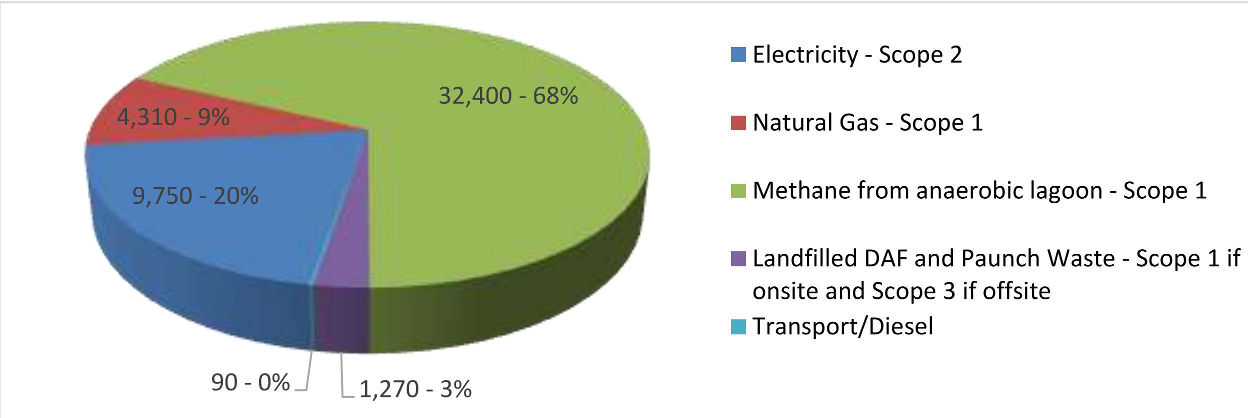

Figure 4: Annual Greenhouse Gas (GHG) emissions in tonnes of carbon dioxide equivalent (tCO_2e) and percentage for a 'typical' 625 head per day red meat processing facility with associated rendering plant.

Scope 2 emissions associated with onsite electricity usage are the second largest source of emissions, with 9,750 tCO_2e accounting for around 20 per cent of total site emissions (slightly lower if coal is used for process heat). Emissions associated with process heat are around 4,310 tCO_2e of Scope 1 emissions if natural gas is used (9 per cent) and 7,430 tCO_2e of Scope 1 emissions if coal is used (15 per cent).

Naturally the exact amounts of GHG emissions and their relative proportions will vary from facility to facility. However, the above analysis identifies the major sources of emissions which provides a solid starting point for examining emissions reductions projects. The generic types of abatement projects for red meat processing sites and their potential under the ERF are examined in more detail in the following section.

4 Preliminary assessment of ERF opportunities

The main sources of emissions from red meat processing facilities originate from wastewater management, the use of electricity and process heat. Projects to reduce these emissions have potential to be included in the ERF. The below sections provide additional information on options for emission reduction projects, such as the combustion of methane from wastewater treatment plants, improved electrical and process heat efficiency, fuel switching and the diversion of waste from landfill. Other 'theoretical' project options such as soil carbon are also mentioned for completeness, even though these projects may be of limited practical interest to red meat processing. However, red meat processing businesses with integrated land assets may be interested these options.

4.1 Wastewater management

The decomposition of volatile solids (VS) occurs under anaerobic conditions within treatment ponds produces biogas, with a methane content of approximately 70 per cent. Methane is a GHG with 21 times the global warming impact of carbon dioxide. The focus of reducing emissions from wastewater treatment ponds is thus the capture and combustion of the biogas, which converts the methane component into carbon dioxide (combusting one tonne of methane avoids 21 tCO_2e of emissions being released into that atmosphere).

Improved wastewater management can be achieved by fitting an impermeable cover to treatment lagoons, effectively capturing biogas produced, or by installing an engineered biodigester to process the wastewater and capture the biogas. The captured biogas can then be directed to a flare or internal combustion engine (for electricity generation and/or process heat and/or cooling) where the methane component of the biogas is combusted.

Capture and combustion of biogas from wastewater treatment at a typical red meat processing facility has the potential to avoid 32,400 tCO_2e of emissions through methane destruction. Note that the avoidance from methane destruction is the same whether the biogas is flared, used in a gas fired boiler or used in an internal combustion engine. Biogas has a calorific value of approximately 26 MJ/m^3 (lower heating value) which is approximately two thirds that of natural gas. Thus there are further emissions reductions when the biogas energy is recovered and used for process heat or in a co-generation system. These additional reductions are considered in the 'Fuel Switching' section below.

4.2 Energy efficiency

Energy efficiency projects result in the same (or improved) productivity being delivered for less energy usage. There is thus a double dividend of reduced energy costs and also reduced GHG emissions. The reduction in emissions is potentially eligible as an ERF project. The two main areas for improving energy efficiency in red meat processing facilities relate to the use of electricity and the use of process heat.

Potential electricity efficiency options include:

- site wide power management and automation system
- refrigeration efficiency
- motor efficiency, including conveyors
- efficient lighting systems.

While the emissions reductions from each project activity are variable, indicative potential savings of 15 per cent across a suite of efficiency projects is achievable. This could translate into emissions reductions of 1,460 tCO_2e at a 625 hpd processing facility.

Improving process heat efficiency begins with boiler house operations. A typical boiler house without an economiser may be expected to be around 75 per cent efficient. Efficiency gains can be made through activities including:

- boiler and burner management systems: digital combustion controls and oxygen trim, automated turndown and floating set points
- improved operation and maintenance of boilers
- installation of an economiser
- blowdown heat recovery
- improved water treatment and boiler water conditioning
- flue gas shut-off dampers and/or combustion air pre-heating
- steam traps, condensate return and flash steam recovery.

As with improving electrical efficiency, the gains from each project activity will vary from site to site, however it is reasonable to anticipate an overall reduction of 15 per cent of process heat fuel consumption. This translates to potential emissions reductions of 650 tCO_2e from reduced natural gas use or 1,110 tCO_2e from reduced coal use at a 625 hpd beef processing facility.

One of the challenges for energy efficiency projects under the ERF will be to isolate energy usage reductions when analysed on a facility basis. For example, due to the complexity of meat processing facilities, efficiency improvements could be lost against the background 'noise' of variations in production and unforeseeable circumstances. For this reason it may be more pragmatic to implement ERF energy efficiency as single stand-alone projects, rather than as a whole of facility project.

4.3 Fuel switching

Emissions reduction projects through energy efficiency concentrate on reducing energy usage and as a result the amount of emissions associated with red meat processing operations. The focus of fuel switching projects is a reduction in the emissions intensity of energy usage, and not necessarily the amount of energy used (although efficiency and fuel switching working in combination provides other advantages such as improved economics).

The main fuel switching activity is switching stationary energy sources such as boiler fuel, from a higher emissions intensity to a lower intensity fuel. For example, switching from coal (88.43 $kgCO_2e/GJ$) to natural gas (51.33 $kgCO_2e/GJ$) or LPG (59.90 $kgCO_2e/GJ$). Similarly a switch from LPG to natural gas would reduce emissions by approximately 14 per cent on a GJ basis.[11]

Here the beneficial use of biogas from an engineered biodigester for cogeneration and/or process heat presents as an ideal opportunity. While energy requirements will vary from site to site, in the 625 hpd site presented here it would be possible for all process heat requirements to be met by the captured biogas.[12] On this basis a biogas fuel switching project for process heat would have

[11] However, note that the high hydrogen content of natural gas (more water vapour after combustion) results in natural gas being approximately 2 per cent less efficient than LPG.

[12] For example, applying NGERS calorific value for biogas, the methane production in the 'typical' facility is equivalent to 92,930 GJ of energy.

the potential to reduce 4,310 tCO_2e emissions if natural gas is replaced and 7,430 tCO_2e of emissions if coal is replaced.

The use of solar energy for electricity is also a fuel switching project that reduces greenhouse gas emissions. However, the electricity output is eligible for accreditation under the *Renewable Energy (Electricity) Act 2000*, which may provide a higher financial incentive than the ERF. Because there is no 'double-dipping' permitted between the two schemes, it is unlikely that solar power projects would be offered into the ERF.

4.4 Diverting organic waste from landfill

Red meat processing facilities have traditionally composted solid waste or used organic waste as a soil additive. However, some red meat processors without available adjacent land send some organic waste to landfills for disposal. For a 625 hpd facility, the diversion of 5,700 tonnes of DAF sludge and paunch combined has the potential to reduce emissions by 1,270 tCO_2e. However note that this amount is likely to be reduced on the basis of existing CFI landfill diversion emissions and be spread over many years to reflect the delayed nature of landfill gas generation over time.

4.5 Other GHG emissions reduction opportunities

There are other emissions reduction opportunities with a theoretical applicability to red meat processing. Soil carbon is one such opportunity. For example, according to the 'Sequestering Carbon in Soils in Grazing Systems' CFI Methodology Determination, the application of organic fertilisers such as manures, composted materials of digestate sludge, qualifies as a new management action and is eligible under the Methodology. However, on the basis of anticipated relatively small gains of 0.3 t CO_2e pa per hectare in soil carbon,[13] relatively high areas of land would need to be involved.

Soil carbon is thus not expected to present an opportunity for GHG abatement for red meat processors except for vertically integrated companies that have large cropping operations or are willing to change pasture management practices.

The use of feed additives and supplements is a similar sized opportunity. For example, the addition of feed additives has the potential to reduce methane emissions from the enteric fermentation in ruminants. However, this opportunity would only be of relevance to meat processing operations that were integrated with meat production operations.

4.6 Summary of ERF opportunities

A summary of the potential emission reduction opportunities for the meat processing industry under the ERF is presented in Table 2 below. A preliminary assessment of the annual abatement potential at a 625 hpd meat processing facility has also been made, with high, medium and low abatement potential designated as over 10,000 tonnes of CO_2e, between 1,000 and 10,000 tonnes of CO_2e, and below 1,000 tonnes of CO_2e respectively. The table below shows that there are sizeable emissions reductions projects available to red meat processors. For example, over 40,000 tonnes of CO_2e emissions reductions could be realised on an annual basis.

[13] http://www.csiro.au/Outcomes/Food-and-Agriculture/Soil-Carbon-Sequestration-Potential-Key-Findings/Key-findings.aspx

Table 2: Detailed Abatement Opportunities for Red Meat Processing Facilities

#	Draft ERF Methodology Determination (ERF MD)	Abatement potential (tCO_2e pa)	Applicability for a meat processing facility	Suggested Actions
1	Carbon Credits (Carbon Farming Initiative) Methodology (**Domestic, Commercial and Industrial Wastewater**) Determination 2014 Exposure Draft	High Up to 32,400 tpa	- Abatement is calculated by how much methane is sent to a combustion device, venting should not occur and sludge waste practices should ensure 100% aerobic conditions (i.e. sludge is blended immediately as a soil amendment). - Existing lagoon to be at least two metres deep - Non-historic waste addition: <0.5% individual source and <2% in total of volume or reduction made.	- Extending Method to include lagoons of <2m - Extending Method to include digester upgrades.
2	Carbon Credits (Carbon Farming Initiative) Methodology (**Industrial Fuel and Energy Efficiency**) Determination 2014 Exposure Draft	Medium to low Electricity: 1,460 tpa Nat gas: 650 tpa Coal: 1,100 tpa	- Highest abatement potential for electrical efficiency projects, however multiple project activities required - Process heat efficiency projects are best for coal boilers from an emissions reduction perspective, however the main driver for efficiency projects will be energy cost reduction rather than ERF revenue.	- Register individual efficiency projects rather than facility wide emissions - Reassess energy efficiency projects in light of ERF revenue in addition to cost savings.
3	Methodology for **diverting organic waste** from landfill to an alternative waste treatment facility	Medium to low Less than 150 tpa for DAF and paunch	- Not all facilities send organics to landfill - Some facilities send more organics to landfill (e.g. sludge) and hence have a higher abatement potential.	- Include DAF and paunch in source separated methodology under development.
5	Carbon Credits (Carbon Farming Initiative) Methodology (**Industrial Fuel and Energy Efficiency**) Determination 2014 Exposure Draft	Medium to high Nat gas: 4,310 tpa Coal: 7,430 tpa	- Solid opportunity to use captured biogas for cogeneration and/or process heat - Low opportunity for switching between different fossil fuels - Solar electricity generation a technical opportunity, but bigger incentive under renewable energy target.	- Ensure that the heat component of a biogas cogen engine attracts abatement credits.

#	Draft ERF Methodology Determination (ERF MD)	Abatement potential (tCO_2e pa)	Applicability for a meat processing facility	Suggested Actions
6	**Sequestering Carbon in Soils in Grazing Systems** CFI Methodology Determination	Low	- Unlikely for meat processor to have grazing land at an appropriate scale.	- Unlikely to be a priority for meat processing industry.
7	**Active livestock feeding** (mentioned in Green Paper; no draft ERF MD)	Low	- Unlikely for meat processor to have integrated feedlots at an appropriate scale.	- Unlikely to be a priority for meat processing industry.

5 Conclusion

The ERF will provide incentives to the Red Meat Processing Industry to undertake emissions reduction projects beyond business-as-usual activities. The potential size of these incentives will vary from site-to-site and depend in part on the potential size of the proposed emissions reduction project.

The main sources of emissions from red meat processing facilities and thus the largest abatement project opportunities, are from wastewater management, the use of electricity and process heat. Based on a preliminary assessment of emissions from a 'typical' facility processing 625 hpd, the largest potential ERF participation by meat processing facilities include:

- capture and combustion of biogas from wastewater treatment, either in a flare, gas-fired boiler or internal combustion engine. It is estimated that up to 32,400 tCO_2e of emissions could be avoided
- fuel switching from the use of coal or natural gas for process heat to biogas as a primary source of fuel for process heat. It is estimated that up to 7,430 tCO_2e of emissions could be avoided for coal replacement (natural gas would avoid 4,310 tCO_2e)
- improving electricity energy efficiency and avoiding 1,460 tCO_2e of emissions
- process heat energy efficiency, with savings of 650 tCO_2e and 1,110 tCO_2e for improving the operation of natural gas and coal fired boilers respectively.

Presently there no approved ERF method statements that would allow participation in the ERF by the meat processing sector. However, there are relevant two draft methodologies that have been released for public comment. These are for:

- domestic, commercial and industrial wastewater
- industrial fuel and energy efficiency.

These two draft methodologies relate to treating industrial, domestic and commercial wastewater in an engineered biodigester and industrial energy efficiency, including fuel switching with biogas. At the time of preparing this briefing paper, the method statements are in varying stages of finalisation prior to finalisation. Part of the work undertaken to date has been to ensure that these emissions reduction project methodologies are applicable to red meat processing facilities.

The preliminary assessment of ERF opportunities is based on the potential volume of GHG emissions reductions, and does not include other factors such as financial viability and ease of implementation. Further assessment by red meat processors is thus required at a project level to determine the desirability of ERF participation.