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Assessing the impacts of Solar on the Australian Agribusiness Sector

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Introduction:

Over the last decade, electricity prices in NSW have almost doubled. The primary driver of this increase are rising network costs. In regional NSW, network costs can comprise almost 60% of an agribusiness's energy bill. Electricity networks have built massive amounts of energy infrastructure to service their predicted demand, which was exaggerated. Network costs have increased significantly as networks attempt to repay the cost of their infrastructure. Additionally, electricity networks are attempting to increase power bills in order to cover their infrastructure spending.

The agricultural sector in the ACT and NSW are currently performing strongly due to sustained demand from export markets. In order to meet demand and maximise profits, many agribusinesses will be forced to modernise and implement new or upgraded machinery, which will lead to an increase in energy consumption. With energy prices predicted to increase, agribusinesses may face higher costs which will detrimentally impact their profit. Dependence on the national energy grid leads to uncertainty about long term energy costs, as well as exposing the agribusiness to reliability issues which may cause a loss of revenue.

The purpose of this report is to identify and analyse the energy consumption patterns of different agribusinesses in the ACT and NSW. Additionally, this report will assess the impacts of implementing Solar Photovoltaic systems, and identify which activities in each sector may benefit the most from solar. Solar Photovoltaic systems suit businesses that require constant baseload power. Processes which require baseload power include pumping water, lighting, conveyor belt operations, office technology (such as computers and lighting), refrigeration facilities and ventilation systems.

This report is designed to be a reference guide to inform managers in the agribusiness industry about the impacts of installing a Solar Photovoltaic system and reducing dependence on the national energy grid. Solar systems will lead to long term savings as electricity and gas costs continue to rise. The long term approach of installing solar align with the strategic goals of many agribusinesses who are concerned with maximising efficiency and farmgate prices, whilst minimising operational costs.

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Cattle and Calves

Feedlot:

Electricity is required for successful operation of many activities undertaken on a feedlot. These include grain processing facilities, water supply, cattle processing equipment, lighting, heating and cooling in offices.

Water Supply

A significant amount of energy is used to pump water from the water source to the feedlot. The amount of energy required is directly related to the distance from the water source to the feedlot, and is also dependent on the water source itself (for example, it may be more expensive to pump water from an artesian bore than it is from an on-farm dam). Thus the cost of pumping water is highly variable between farms and depends on a number of factors as listed above. Additionally, the efficiency of the pump system directly influences energy costs, with gravity pumps requiring significantly less energy than wholly electric pumps.

The energy usage for water supply averages approximately 8.33 kilowatts (30MJ) per head-on-feed. This is approximately 4% of energy used on the farm.

Feed Processing

Feed processing is comprised of a number of activities which require significant energy. Grains must be processed in order to optimise their utilisation by livestock and to ensure diet stability. Through ensuring a specific mixture of feed, the business owner can reduce risk of illness related to an unsuitable or inadequately nutritious diet. These include grain poisoning (acidosis) which may occur if cattle are weaned off grasses (and onto grains) too quickly.

Feed processing includes activities such as grain storage, mechanical grain handling, grain processing and feed-mixing. Whilst these processes are common to most feedlots, there are numerous ways to process grain, and thus the energy usage of this activity is highly variable between feedlots.

Some feedlots undertake a unique type of processing known as steam flaking. This process is used to rehydrate overly dry grain, which may improve the conversion of feed and thus cattle growth. This activity is used as an alternative to dry rolling (simply breaking the seed case). Steam processing may increase the digestibility of the feed, however requires additional water and energy to produce the steam. Natural gas is the most commonly used fuel source for steam flaking.

Feed processing (without steam flaking) uses between 5.56 kilowatts (20MJ) and 13.9 kilowatts (50MJ) per tonne of grain processed. For steam flaking facilities, energy usage ranged from 66.67 kilowatts (240MJ) and 87.5 kilowatts (315MJ) per tonne of grain. Depending on the grain processing method, this can range up to 70% of the feedlot’s energy usage.

Feed Transport

The delivery of feed from processing facilities to feedlots requires a significant amount of diesel fuel, with one litre of diesel fuel consumed per tonne of ration delivered. This transport of feed is usually done by trucks, although there is potential for conveyor belts to be implemented more widely.

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Cattle Washing

Cattle washing facilities vary greatly between feedlots, with many feedlots having no washing facilities available. The decision as to whether cattle washing will be undertaken is usually made by the abattoir, which sets standards on the cleanliness of cattle.

Feedlots which undertake cattle washing consume approximately 0.28 to 3.33 kilowatts (1-12MJ) per head washed. This activity is responsible for approximately 0.5% of energy usage on the feedlot.

Waste Management:

Waste management activities incorporate the collection and transport of manure to storage, and the cleaning of the feedlot itself. The energy consumption is of these activities is highly variable between feedlots, as the frequency of cleaning, equipment used and the volume of manure removed vary greatly.

On average, waste management activities use between 20–50 kilowatts (72-180MJ) per head-on-feed per year. Thus waste management activities are responsible for the consumption of 7-24% of energy on the feedlot.

Administration and Minor Activities:

This includes energy usage in offices, staff amenities and for operation of staff vehicles around the facility. Offices have numerous requirements for energy, including air conditioning/heating, lighting, hot water generation and office equipment (including computers, fax machines, photocopiers and kitchen appliances).

Energy is also consumed through undertaking minor activities such as repairs and maintenance. Most feedlots have a workshop facility which is used for repairs of machinery and vehicles. Additionally, feedlots often have a cattle hospital to ensure the health of their cattle, which may contain energy intensive veterinary equipment.

Energy is also used for processing cattle on arrival and dispatch from the feedlot. A weighbridge is a necessary piece of equipment for all feedlots, as it is used to measure the weight of cattle entering and leaving, thus showing the total liveweight gain.

On average, energy usage by administration and minor activities are responsible for between 4%-30% of the total energy usage on the feedlot.

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Figure 1.1 Energy Usage on a Typical Feedlot

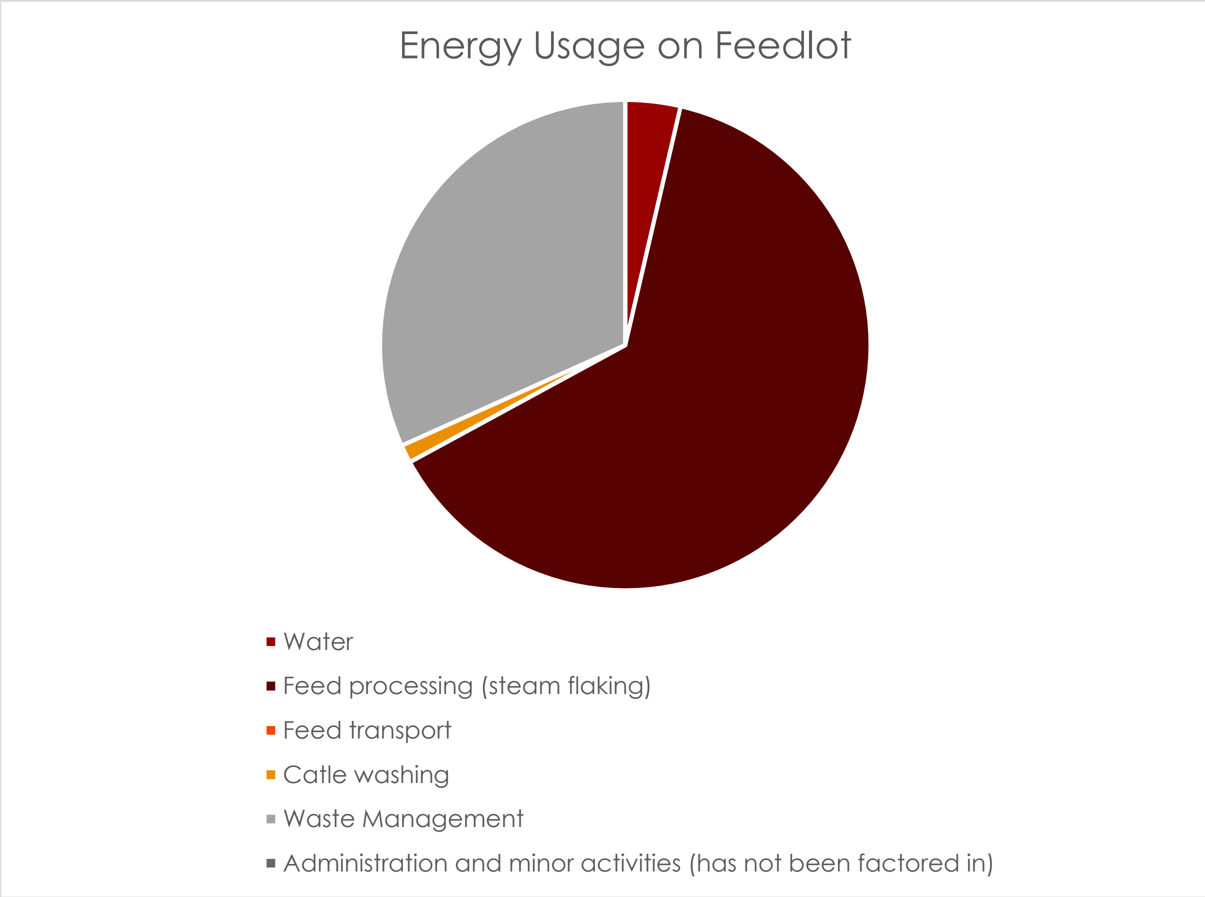

Figure 1.1 shows the average energy usage on a typical feedlot. Total energy usage generally ranges from 123.33 kilowatts (444MJ) to 411.94 kilowatts (1483MJ) per head of cattle. The largest variation in energy use is due to is the type of feed processing which is undertaken.

Potential changes/challenges to the industry:

As of February there were 964,968 cattle in feedlots across Australia, which is an increase of almost 20% from the corresponding period in 2014. If these trends continue, feedlots will face significantly higher energy use as most energy consuming activities are variable and based on the number of heads of cattle. In New South Wales, the number of cattle in feedlots (with a capacity for one thousand head of cattle or fewer) has increased by 100% to 18,000 in the past 12 months, showing that there has been strong growth in the number of cattle in small feedlots. There are currently 315,863 heads of cattle in feedlots in NSW.

There are a number of changes and challenges that are unique to the sheep industry. The price of lamb and mutton are predicted to follow current trends and increase over the next five years. Lamb exports are predicted to reach a record 240,000 tonnes in 2014-15, worth $1.64 billion due to continued demand from exports markets in the US and Middle East. As a result, saleyard prices are expected to increase by 14.5% in 2015-16. This will put pressure on sheep farmers to increase the size of their flock, which will lead to an increase in energy costs.

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Impacts of solar on feedlot

The implementation of a Solar Photovoltaic system would allow the owner of the feedlot to significantly reduce energy costs. Solar Photovoltaic system is generally suitable in feedlots due to the nature of the industry and consumption habits. Feedlots generally have a high baseload energy usage due to pumping, feed processing and administrative activities.

Energy consumption through water supply can be offset through the installation of a solar pump.

Feed processing is often the largest component of energy consumption on the feedlot. If the feedlot undertakes energy intensive feed processing activities such as steam flaking, the electricity costs of the feedlot will be very high. The implementation of a solar system as a substitute for energy from the grid and LNG/natural gas will allow significant cost savings.

Transport of feed from the processing site to the feedlot is usually undertaken by trucks running on diesel fuel. Installation of conveyor belts powered by Solar Photovoltaic systems will allow the business to reduce emissions and save money in the long term (as diesel prices are expected to increase by approximately 0.8% per annum).

The consumption of energy for administrative purposes may vary significantly between feedlots, depending on whether the feedlot has on-site office and/or staff facilities. Office technology and appliances such as computers, lighting and refrigerators may be powered by a solar system.

The optimal location for solar panels is dependent on the layout of the feedlot. If there is a large roof area (e.g. for feedlots with an on-site office) there may be adequate space for solar panels. If there is an on-site grain processing facility, roof mounted solar panels would be preferable as they optimise space and would be in close proximity to processing machinery, reducing the need for lengthy cables. If there is inadequate roof space, the solar panels may be ground mounted. If this option is selected, the agribusiness must consider installing a fence to protect the solar panels from inadvertent damage (e.g. from livestock).

Pasture:

Energy consumption required for cattle production on pasture is significantly lower than the energy consumption of a feedlot. This is because there is no processed feed and so feed processing and transportation are not required. Additionally, waste management is rarely required.

A water pump is used to transfer water from the water source. It is required in all cases except if the pasture has a water source on site (such as a suitable creek or dam). Water pumps are usually in operation for a set time of day to ensure adequate water supply to cattle. Recirculating systems require the pump to be in operation for 24 hours per day.

Cattle washing facilities are sometimes required in order to ensure cleanliness of cattle and to meet requirements set by the abattoir. The cattle washing facilities are dependent on the number of cattle on the pasture, and the requirements of the abattoir.

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Administration and minor activities may be major energy consuming activities on the pasture. Power for offices and fuel to power machinery are usually the largest energy consuming activities on pasture. This is variable across pastures as some farms do not have on site offices. Office equipment such as computers and lighting and staff amenities such as refrigerators and dishwashers may consume significant quantities of energy. This electricity is usually sourced from the national energy grid.

Potential challenges/changes:

The increase in demand for Australian beef spurred by a growing middle class in China will likely encourage farmers to increase the number of head of cattle in order to maximise profits. This will lead to an increase in energy use and lead to higher variable costs for the business.

Impacts of solar on the industry

There are numerous applications for solar in this industry. A solar powered water pump can lead to significant efficiency gains in energy consumption. Additionally, if the agribusiness has an aggravated turnover of less than $2 million, they may be able to immediately write off a solar pump as it is a depreciating asset. The system must cost under $20,000 for this to apply. This is described in further detail in the Tax Laws Amendment (Small Business Measures No. 2) Act 2015 as accelerated depreciation of assets.

Another potential use for solar energy is to offset the energy use of the on-site office and staff amenities. Office equipment and staff facilities usually use electricity from the national grid. As pastures are located in regional/remote areas, the cost of electricity is higher than in urban areas. A solar system can reduce the businesses reliance on the national grid (or disconnect completely) which will lead to long-term savings.

The optimal location for solar panels is dependent on the layout of the pasture. If there is a large roof area (e.g. for farms with an on-site office) there may be adequate roof space for solar panels. This is preferable as it utilises otherwise unused space and reduces the need for lengthy cables. For example, solar panels may be placed on the roof of the office to power office facilities. If there is inadequate roof space, the solar panels may be ground mounted. If this option is selected, the agribusiness must consider installing a fence to protect the solar panels from inadvertent damage (e.g. from livestock).

Abattoir/Meat Processing:

To operate a meat processing and/or abattoir facility is extremely energy intensive. There are many variables which will affect the amount of energy required by the abattoir, including the location of the market, activities undertaken, throughput and species processed.

Location of market: If the meat is to be exported, a large amount of chilling must be undertaken in order to maximise shelf-life. This leads to a significant increase in energy requirements when compared to facilities which only provide meat to the domestic market.

Activities undertaken: Abattoirs vary greatly in their scale and scope. Some smaller abattoirs only contain a slaughter floor and/or boning room, whilst some larger abattoirs have both a slaughter and boning room, as well as further processing (including rendering facilities). Additionally, certain abattoirs are able to produce more highly valued meat (such as salami) which requires additional energy. The inclusion of rendering facilities has the largest effect on the total energy consumption of the abattoir.

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Throughput refers to the rate at which meat can be produced. As the throughput of the abattoir increases (signalling an increase in the abattoir's efficiency), the energy use increases due to higher rates of production.

Species processed: Pig plants require a large amount of hot water and steam, and thus require a large amount of energy to heat water. Cattle and lamb abattoirs require less energy due to less hot water being required.

Sheep processing requires less energy than cattle processing as the meat is not aged for as long and many abattoirs ship sheep out as an entire carcass.

For cattle and lamb abattoirs, 30-77% of energy consumption is for thermal energy generation (that is; heating water and producing steam).

Energy consumption within an abattoir/meat processing facility is also used for refrigeration, compressed air and lighting.

Natural gas and liquefied petroleum gas (LPG) are used for thermal energy generation.

Electricity and natural gas usage is approximately equal for sites which do not incorporate rendering facilities, whilst sites with the capability to render use significantly more natural gas/LPG than electricity (between 60-80% of the energy required is sourced from natural gas/LPG).

Energy use is highest during plant operation (generally from 4:30am-5:30am until 2:30pm-3:30pm on weekdays. Energy use is lowest on weekends when the abattoirs are usually closed. The energy usage is highest during the boning stage and initial stage of carcass cooling (between 5am and 2:30pm). The peak energy usage is between 9:30am and 1:30pm.

There is an increase in energy use during the summer months due to an increased need for cooling and refrigeration facilities. Conversely, there was an increase in gas consumption in the winter months due to higher load on the hot water system.

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Figure 2.1 Comparison of abattoir energy consumption on typical weekday and weekend

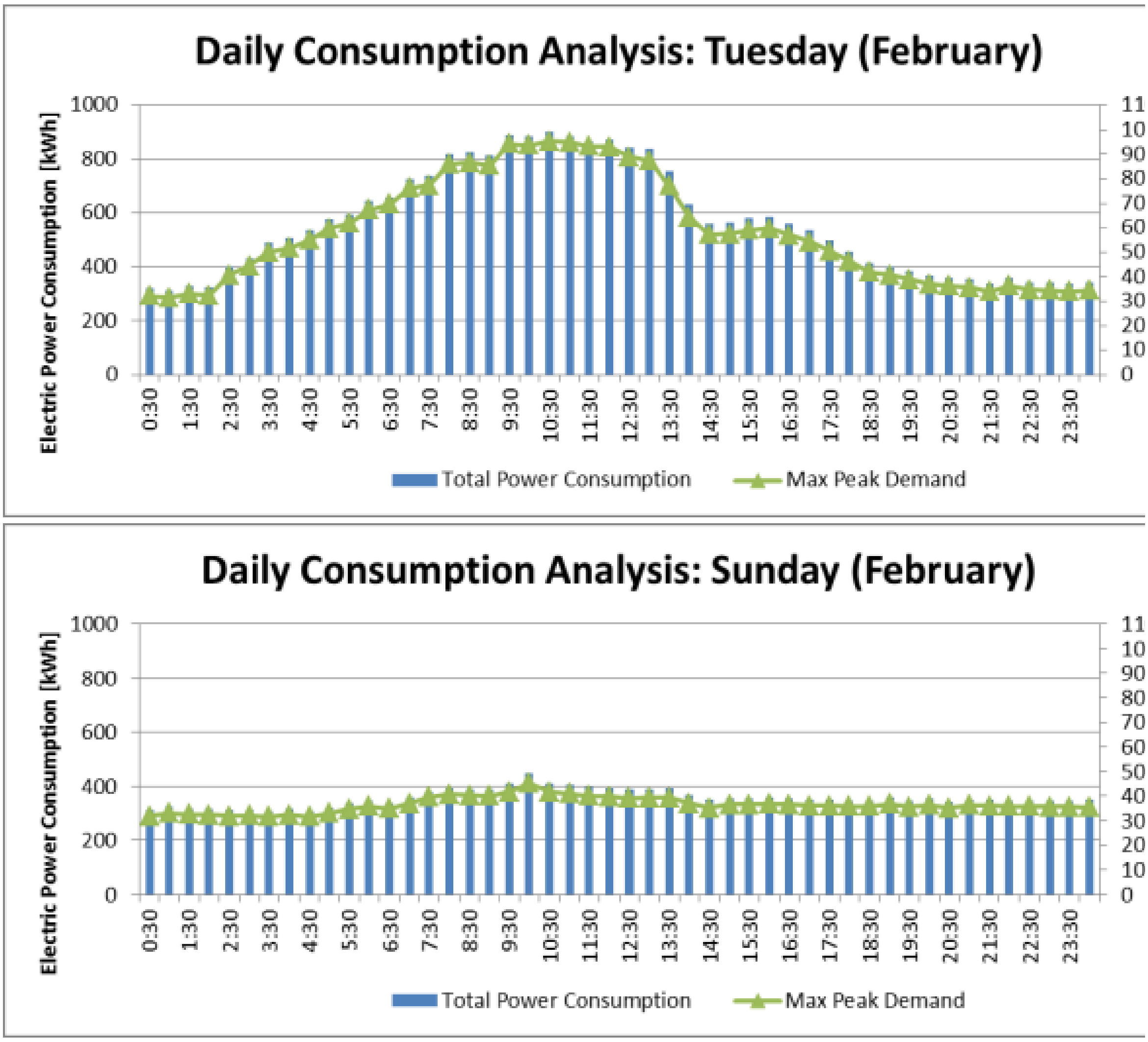

Figure 4: Weekday & weekend hourly profiles Category D (AMPC DPEEP, 2012)

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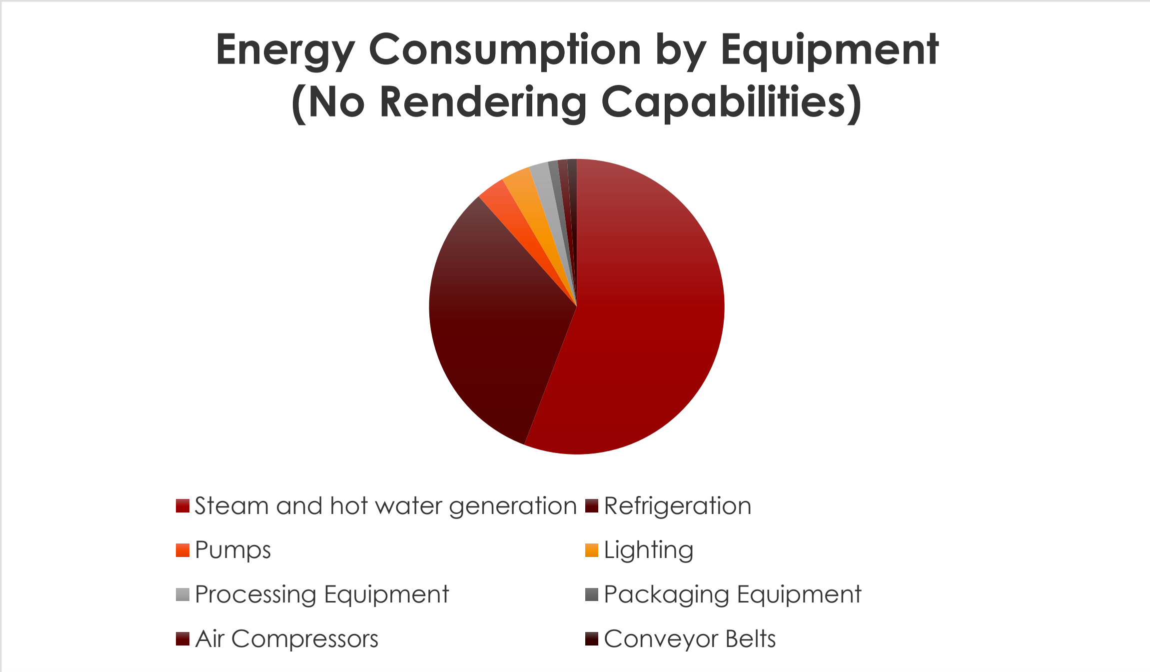
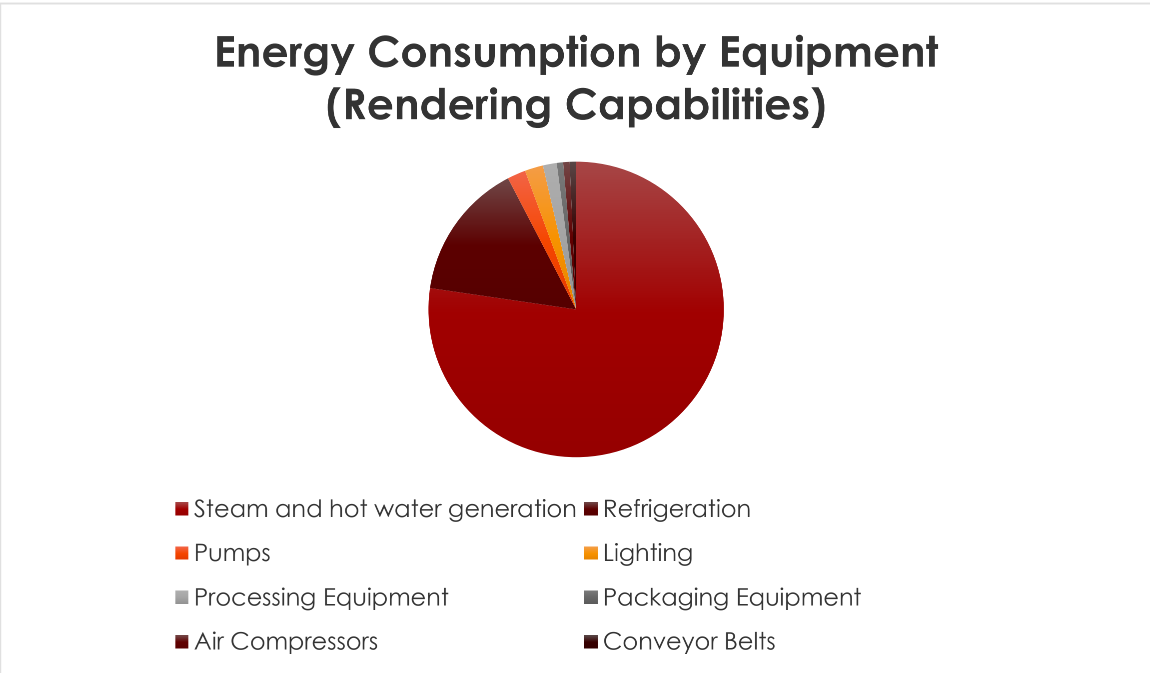
Figure 2.2 Comparison of typical energy usage by machinery within abattoir





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Energy consumption by equipment type:

Steam and hot water generators:	53-77%
Refrigeration equipment	15-31%
Pumps	3%
Lighting	3%
Processing equipment	2%
Packaging equipment	1%
Air compressors	1%
Conveyor belts	1%

Average monthly energy consumption is between 250,000kWh (900,000MJ) and 360,000 kWh (1,296,000MJ).

Potential challenges/changes to the meat processing industry:

Due to abattoirs having high energy requirements, they will face additional strain as electricity prices continue to increase (as predicted). Additionally, abattoirs are usually located in regional and/or remote areas which commonly face higher energy costs per kilowatt than businesses urban areas.

Impacts of solar on abattoirs/meat production facilities:

The installation of an appropriate solar system will allow the abattoir to offset some of the energy costs. A system with guaranteed quantities of energy generation allows the abattoir to insulate itself from the risk of rising electricity prices.

Electricity costs are predicted to rise slightly over the next 5 years. However, gas prices are increasing steadily and will significantly impact the profits of abattoirs. The majority of energy use in an abattoir is due to heating water and producing steam. As most abattoirs use natural gas or liquefied petroleum gas to heat water, energy costs will increase in the coming years with no signs of stabilising. The implementation of a Solar Photovoltaic system will allow the abattoir to reduce its dependence on gas, leading to savings in the long term as gas prices continue to rise. An increase in demand for Australian LNG from East Asia is leading to a massive increase in gas production to be exported. This is predicted to lead to significant increases in the price of natural gas for NSW consumers, who will be exposed to the global market price for gas. A statement from ANZ says that it is likely that domestic wholesale gas prices will triple over the next three years.

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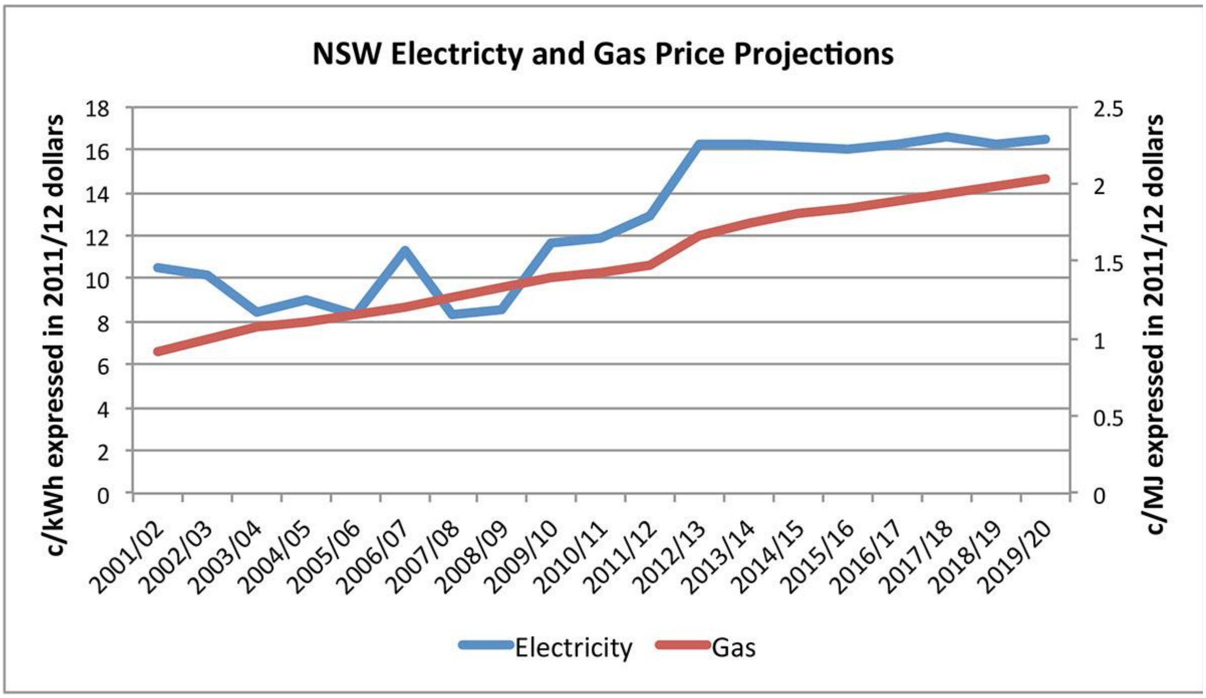
Figure 2.3: NSW Electricity and Gas Price Projections



Source: **UTS Institute for Sustainable Futures, NSW Business Energy Prices to 2020, Dec 2012).**

Abattoirs usually have a large amount of unutilised roof space. This makes roof mounted solar panels the optimal layout as no ground space is required. Additionally, there is usually no need for lengthy cables as the solar panels are in close proximity to machinery.

Wool

The processes involved in the production of wool have not changed significantly in the past few decades. Businesses in the wool production industry (particularly sheep shearing) must consider implementing modern technology in order to maximise efficiency of production – thus reducing costs and improving profits.

There are a number of energy consuming technologies which are common to all sheep shearing facilities. These include machine shears, counting out systems, electronic wool presses and adequate lighting.

Shearing plants have a 300W (1.1MJ) motor. They are only used for a small number of weeks per year.

Shearing sheds: energy usage – shearing only occurs one month of the year.

Counting out systems: Energy use is negligible.

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Electronic wool presses are used to compress the shorn wool to increase the efficiency of storage and transport. The motor is approximately 2.2kW (7.9MJ).

Lighting is essential so that shearers can see and harvest the optimum amount of wool. Currently, some shearing sheds rely solely on natural lighting. Using electric lighting allows an increase in efficiency and also reduces the chance of shearers accidentally injuring sheep. Additionally, floodlights may be installed in order to allow shearing at night, which improves efficiency as more sheep can be shorn per day.

Some shearing sheds have on-site offices and staff facilities which may be energy intensive. Office equipment such as computers and lighting and staff amenities such as refrigerators and dishwashers may require large amounts of energy. This electricity is usually sourced from the national energy grid.

There is potential for significant improvements in efficiency within the sheep shearing industry. Conveyor belts and mechanised sheep loaders allow throughput to be increased and decreases the amount of energy required to bring sheep to the operating (harvesting) position.

Another major improvement in efficiency may be obtained through the implementation of upright shearing machines. These significantly reduce the effort needed to shear sheep, whilst also significantly reducing the risk of injury to workers. These technologies would require an increase in energy use, but would lead to immediate increases in efficiency.

Potential challenges/changes

There has been a significant decrease in the number of young workers entering the sheep shearing industry due to strenuous working conditions. In order to ensure that there is an adequate amount of available labour, business managers must consider improving their efficiency and working conditions. A report by the Department of Primary Industries stresses that there is a need to make the industry more satisfying and profitable, especially for young people. They suggest that the industry must incorporate more technology to attract young entrants and enhance profitability.

Impacts of solar on the wool industry

The incorporation of new technologies is considered to be critical by the DPI. These will inevitably lead to an increase in energy consumption as the shearing shed is modernised. The implementation of a solar system will allow the business to become partially or completely independent from the national energy grid. This is important as the cost of electricity is usually high in rural areas. In Goulburn, the average cost of electricity from the grid is over 30c per kW (provided by the Endeavour Energy network).

Thus the sheep shearing industry can increase efficiency through improving its technology whilst also improving the efficiency of the energy source. Solar panels can be mounted on the roof of the shearing shed, which would be optimal as the distance from panels to the machines will be minimised.

Sheep shearing stations are often dislocated from the energy grid due to their remote location. The implementation of a Solar Photovoltaic system can be used as an alternative to a connection to the energy grid, which can be extremely expensive depending on the distance to the shearing shed.

Shearing sheds are not energy intensive, and only operate for a few weeks of the year, therefore installing a solar system to generate the total quantity of energy required for this limited timeframe may not be financially appropriate. Solar panels can be mounted on the roof

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of the shearing shed, which would be optimal as the distance from panels to the machines will be minimised.

Dairy

There are a number of processes on a dairy farm which require electricity. These include milking, milk cooling, heating water, lighting and ventilation.

The process of harvesting and transporting milk occurs daily. On average, the milking and transport process is responsible for 18 percent of the dairy farm's energy use.

Milk cooling is required to ensure milk quality and prevent an excessive bacteria count. This set of processes is the largest consumer of energy on the dairy farm, comprising approximately 30% of total energy usage.

The production of hot water is essential in order to clean milking systems. This varies significantly depending on the size of the herd and the size of the milking system. The energy required to produce hot water generally accounts for 20-25% of the total energy use of the farm.

Adequate lighting is required to improve productivity and safety. On average, lighting is responsible for 17% of the total energy use of the farm.

In NSW, approximately 150-151 kWh of electricity are used on a dairy farm per day. This equates to approximately 54,932 kWh (197,755.2MJ) of energy required annually.

Potential challenges/changes

A report by the Australian Bureau of Agricultural and Resource Economics predicts the conditions for Australian dairies to improve in the near future, with a 2c per litre increase in the farmgate price of milk and a $200 million dollar increase in the value of dairy exports. An increase in demand for Australian dairy products will encourage farmers to increase milk production, which will require an increase in electricity consumption.

Impacts of solar on the dairy industry

Due to the nature of energy consumption in dairy farming, the implementation of Solar Photovoltaic systems is an appropriate solution. Milk processing, milk cooling, water heating and lighting are all energy intensive and require a significant amount of energy from the grid. In regional areas, the cost of electricity often exceeds 30c per kilowatt hour. A solar system allows the dairy farm to generate energy independently from the grid, reducing dependence on the high (and increasing energy prices). The aforementioned activities constitute approximately 85% of the energy needs of the farm, and can all be replaced with solar implementation.

Cherries and other stone fruit

The Capital Region of NSW is a major producer of Cherries in NSW, producing approximately 34% of the total value of cherry production in NSW. Young is the cherry capital of Australia, producing 2,500 – 4,000 tonnes of cherries annually.

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There are a number of energy intensive processes which are necessary for the efficient production of cherries and other stone fruit. These include cooling facilities, cutters and canning/packing facilities (when applicable).

Due to cherries having soft flesh, and thus being easily damaged and spoilt, growers require cooling facilities to prevent a deterioration in quality. The two most common methods of cooling cherries are through playing them in a cool-room or hydro cooler (where chilled water is sprayed onto the fruit to reduce its core temperature). Both of these methods are extremely energy intensive.

Cutters are occasional used in order to separate each cherry.

Conveyor belts are used to transport cherries through the sizers in order to allocate them into different size groups.

The cherry farm may include packaging facilities, which may involve staff packing cherries into punnets by hand, or mechanised tinning facilities. The technological complexity of the facilities will determine the energy requirements of this process.

In NSW, the first cherry harvest occurs in October/November and extends through to late February. The majority of cherry crops are harvested during December and January.

Energy usage will be highest during the day when cherry processing is being undertaken, and lowest during non-operational hours (generally between 5pm and 6am. However, there is still potential for energy costs to be high in this period, as baseload activities such as refrigeration will remain active.

Potential challenges/changes

The Australian cherry industry is rapidly expanding due to international demand for Australian produce. In 2012, approximately 80% of Australian cherries were consumed domestically, with the remaining 20% exported. Currently, almost 50% of Australian cherries are being exported. Major export markets include Hong Kong, Taiwan, South East Asia, the Middle East, United Kingdom and Europe. Emerging and potential export markets include China and Thailand.

Impacts of solar on this industry

The level of mechanisation of cherry farms varies significantly, however all cherry farms can benefit from the implementation of a suitable solar system. All cherry farms require cooling facilities, which have high energy requirements. The reliance of cherry farmers on the national energy grid puts them at risk of facing increasing energy costs. This risk and uncertainty can be mitigated through adoption of solar technology.

Solar panels may be placed on the roof of cherry processing facilities, which would minimise the distance from the panels to the machines. Mounting solar panels on the roof would be a favourable alternative to ground mounting as roof mounting can utilise unused space.

Poultry

The production of poultry is highly energy intensive, primarily due to the need to maintain optimal temperatures year round. The two activities which consume the majority of energy are heating and ventilation.

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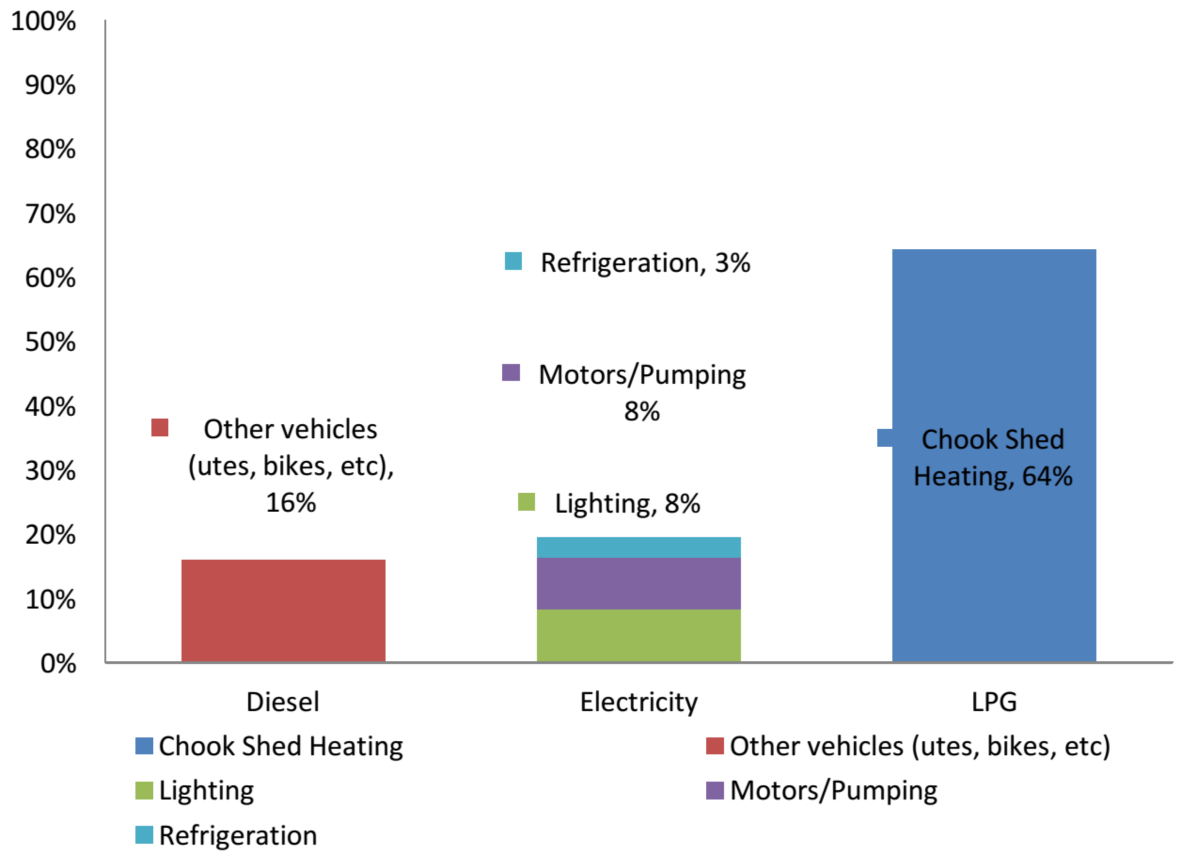
Heating: It is critically important to maintain appropriate temperatures in order to maximise bird growth and ensure bird health. On average, heating is the most energy intensive process on a poultry shed.

Ventilation: Traditionally, poultry sheds in Australia have been naturally ventilated. This does not allow for complete control over conditions. The alternative ventilation method, mechanical ventilation, allows for greater control of conditions. This in turn allows for maximised bird growth, health and quality, allowing the agribusiness to maximise revenue.

Figure 3.1: Energy breakdown of a poultry farm in Tamworth



Source: NSW Farmers.
N.B. The above case study shows a farm that uses natural ventilation.

Water pumps are usually in operation for a set time of day to ensure adequate water supply to poultry. Recirculating systems require the pump to be in operation for 24 hours per day.

Administration and minor activities: Some poultry sheds have an on-site office and/or staff facilities. Office equipment such as computers and lighting and staff amenities such as refrigerators and dishwashers may consume significant quantities of energy. This electricity is usually sourced from the national energy grid.

Potential challenges/changes:

There has been a major increase in the amount of poultry produced in Australia over the last 50 years. This is largely due major to productivity increases lowering price of chicken meat relative to other meats. Chicken meat is projected to remain substantially cheaper than beef, pork and lamb.

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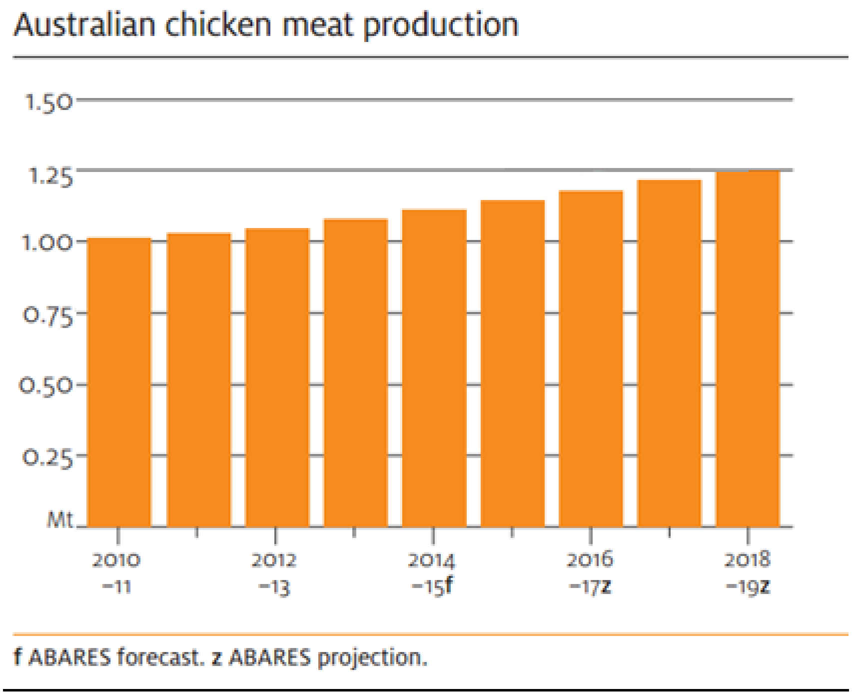
Domestic demand accounts for 95% of consumption of Australian poultry, and is expected to increase.

Figure 3.2: Australian Chicken Meat Production



Impacts of solar on the industry

The implementation of Solar Photovoltaic systems mitigates the risk of black outs or brown outs which may cause heating or cooling failures. In this scenario, many thousands of birds may die, meaning a significant loss of revenue for the farmer.

Due to solar panels maximizing energy output in the summer months, they may be used to power mechanical ventilation and refrigerators which require large amounts of energy in the warmer months,

A solar powered water pump can lead to significant reductions in energy costs. Additionally, if the agribusiness has an aggravated turnover of less than $2 million, they may be able to immediately write off a solar pump as it is a depreciating asset. The system must cost under $20,000 for this to apply. This is described in further detail in the Tax Laws Amendment (Small Business Measures No. 2) Act 2015 as accelerated depreciation of assets.

Another potential use for solar energy is to offset the energy use of the on-site office and staff amenities. Office equipment and staff facilities usually use electricity from the national grid. As poultry sheds are located in regional/remote areas, the cost of electricity is higher than in urban areas. A solar system can reduce the businesses reliance on the national grid (or disconnect completely) which will lead to long-term savings.

There is usually a large amount of unused space on the roof of poultry sheds. Therefore, roof mounted solar panels are usually preferred to ground mounted system as they require less space. Additionally, placing solar panels on the roof above machinery (such as heaters or mechanical ventilators) removes the need for lengthy cables, making this the most cost effective option.

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Conclusion:

Whilst every agribusiness has differing energy requirements, there is potential for any agribusiness to make significant cost savings through the implementation of a Solar Photovoltaic system. The implementation of Solar Photovoltaic systems in regional areas have a short term payback period with a lifecycle of over 25 years (and a performance output guarantee). Therefore implementation of a solar system is an economically appealing business decision due to mitigated uncertainty.

This report has analysed the typical energy use of a number of agribusiness types in the ACT and NSW, and identified the benefits of installing solar systems for each business type.

These benefits may include long term savings as energy costs continue to rise, and a reduced reliance on the national energy grid, which mitigates uncertainty about energy prices. Additionally, a reduction in reliance on the national energy grid helps insulate agribusinesses from reliability issues typical to the grid. Reliability issues may lead to a decrease in the revenue of agribusinesses due to power outages (i.e. black-outs or brown-outs). This uncertainty can be offset through the installation of a Solar Photovoltaic system, which ensures that changing energy costs do not threaten the viability of the agribusiness.

As a long term investment, Solar Photovoltaic systems suit agribusinesses that are concerned about improving their operational efficiencies. Independence from the national energy grid is now a realistic opportunity with financially attractive returns.

**About Clean Energy Corporation Australia:*

Clean Energy Corporation Australia is design and installation organisation providing cost-effective solar system solutions. Clean Energy Corporation Australia looks at solar as-a-service to our agribusiness clients, to manage the system, maintenance and optimise the system, tailored to the business' needs.

Clean Energy Corporation Australia specialises in advising and assisting agribusiness finance and accounting firms across NSW and the ACT.

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