

SFMCA 2016 Energy Use Survey Report

INTRODUCTION

The SFMCA commenced its energy surveys in 2012 and this is the fifth annual report. The report is based on data from members that have voluntarily agreed to supply information relating to their energy use in the manufacture of stockfeed. The data generated from these surveys provides valuable comparative data for individual companies to benchmark their energy use against other manufacturers.

OBJECTIVES

The SFMCA has undertaken this survey of members to generate information for two purposes:

1. Provision of collated data that members can use to benchmark their operations energy use and energy cost.
2. Calculation of greenhouse gas emissions and CO₂ production per tonne of feed manufactured, with the view of generating data trends over time.

METHODOLOGY

All manufacturing members of the SFMCA were invited to complete a survey of their energy use and cost for the 12 month period 1 July 2015 to 30 June 2016. Manufacturers were asked to exclude use within transport vehicles, both inward raw materials and outward feed delivery. In addition the quantity of solid organic waste removed from the site was requested, together with water use. The survey also required feed volumes being split between mash and pellets.

Explanatory Note: Information in this survey report is subject to the accuracy of data supplied from participating feed mills. Where data appeared to be in error, the respective mill was requested to verify the data supplied. SFMCA makes no representation as to the absolute accuracy of the data supplied by individual manufacturing companies.

Confidentiality: Data from SFMCA members is presented in total figures, or where site related identification of any individual companies or sites is not provided. All data supplied from SFMCA members is held as confidential and not for circulation to other parties.

RESULTS

1. Survey Participation

In 2016 there was data submitted from 29 mills. This was a decline in survey participation, down from 38 sites taking part in 2015 and 43 sites in 2013 and 2014. The 2016 results only includes one mill that is dedicated to mash feed manufacture. The data however covers the manufacture of 3.23MMT of feed, just below the 3.36MMT within the 2015 survey.

The average mill size from survey participants was 111,440 tonnes per annum, this being a jump over the 93,336 tonne average for 2015. The reader should note that the data provided within the report is seen to be more typical of medium to large Australian feed mills. There is a lack of data submission from smaller feed mills in the survey.

The split by feed type with number of mills and volume is shown in Table 1.

Table 1. Feed volume of sites taking part in the survey

	Mash only	Both Mash & Pellets	Pellets only	Total
No. sites	1	16	12	29
Tonnes	17,137	1,567,379	1,647,248	3,231,764
Ave site volume - tonnes	17,137	97,961	137,271	111,440

2. Energy Use Data

2.1. Electricity – Electricity use was found to average 27.2 **kwhrs/tonne** with this being higher than previous years as shown below. The higher use per tonne is in part a function of less mash feed mills taking part in the survey. In 2012 and 2013 the proportion of mash feed manufactured as part of the survey was 20% and 15% respectively. For the 2016 survey, mash feed manufacture represents only 6.5% of the volume manufactured by survey participants. There is not believed to have been any decline in manufacturing efficiency across the industry. Due to rising electricity prices there would more likely have been greater focus from mills in reducing energy use. The individual mills taking part in the energy survey have not remained the same from year to year and comparing between years needs to be treated cautiously.

Year	Average Kwhrs/tonne
2012	25.2
2013	26.7
2014	23.6
2015	27.0
2016	27.2

The lowest electricity use was in the mash only feed mill and, as in previous surveys, identifies the considerably lower electricity use in the manufacture of mash feeds. The highest use was within a mill manufacturing harder to pellet products, with significant raw material milling and energy use in running high horse power press motors. Excluding the lowest and highest use mills, other mills were in the range 16 to 37 kwhrs/tonne. Mills that manufacture both mash and pellets generally use less electricity per tonne than mills dedicated to pelleted feeds only.

Electricity Use	Kwhrs/tonne
Lowest	5.5
Average	27.2
Highest	62.5

Electricity power factor was in the range 0.77 to 0.99. There were 80% of mills with their power factor being above 0.90, mills with lower power factor are less efficient in utilising electricity being supplied.

Electricity supply includes real power that is used in equipment (motors, lighting, etc) and reactive power that is not directly used. Power factor is the relationship between the two. Mills that have low power factors are paying for electricity that is not being used. In effect a low power factor is in sites that are using only 70 to 90% of the electricity supplied and the best mills are utilising 90 to 99%. Many mills have installed power factor correction equipment to increase their electricity use efficiency.

Electricity cost per kwhr varies considerably between companies, the factors seen to be of influence are:

- Contract price and timing - mills that have longer term contracts have benefited from protection of rising prices over time.
- State - mills in SA and Victoria have been paying lower electricity prices than other states, with recent price rises taking them closer to other state costs.
- Buying volume – the largest mills with greater electricity use gain from lower electricity pricing.

Due to the limited number of companies supplying price data and the need for confidentiality, no electricity pricing data is provided.

Based on electricity cost and volume data provided, the lowest, average and highest cost per tonne is shown below. These costs are lower than previous surveys due to some larger volume mills providing their cost data for 2016 and some smaller mills not providing data. If data was available from some of the smaller SFMCA member mills (as in previous survey years) it is believed the average cost would be higher and closer to the 2015 average \$6.46/tonne.

Electricity cost per tonne of feed was calculated for mills supplying cost data:

Lowest cost	\$2.72/tonne
Average cost	\$4.51/tonne
Highest cost	\$9.00/tonne

2.2. Natural Gas and LPG – measured in GJ/tonne of feed, gas is used primarily for boiler operation in feed mills with pelleting capability. Use of LPG for forklifts is relatively minor relative to boiler use. The table below shows that gas use when allocated against pellet manufacture only ranges from 0.15 to 0.34 GJ/tonne.

Gas Use	GJ/tonne all feed	GJ/tonne pellets only
Lowest	0.14	0.15
Average	0.19	0.20
Highest	0.31	0.34

The price paid for natural gas and LPG reflects buying volume advantages for the largest milling companies. The following table provides the lowest, average and highest prices paid. The table excludes bottled LPG purchase for fork lift operation.

Gas Cost	Natural Gas \$/GJ	LPG \$/GJ
Lowest	9.02	14.60
Average	10.97	16.60
Highest	19.53	25.90

Gas cost (both natural gas and LPG combined) per tonne of feed, range from very low in mash feed mills to being a considerable manufacturing cost for mills with pelleting capacity. The average gas cost is \$2.85/tonne. The cost is influenced by the proportion of pellets manufactured by each mills, with most gas being used for boiler operation.

Gas Cost	\$/tonne pellets only
Lowest	1.93
Average	2.87
Highest	6.55

2.3. Total Energy Use – the survey data has been used to convert total energy used from electricity, natural gas, LPG, diesel and petrol into GJ energy units. The table below excludes the mash only mill that used a low 0.02GJ energy per tonne manufactured.

Total Energy Use	GJ/tonne
Lowest	0.22
Average	0.30
Highest	0.45

The total energy cost including electricity, natural gas, LPG, diesel and petrol for all mills supplying data is shown below.

Total Energy Use	GJ/tonne
Average energy cost mash only mill	\$3.32

Lowest energy cost mash/pellet and pellet only mills	\$5.25
Average energy cost mash/pellet and pellet only mills	\$7.33
Highest energy cost mash/pellet and pellet only mills	\$14.75

3. Carbon Emissions Calculation

Carbon emissions calculations were completed in accordance with the National Greenhouse Accounts Factors published by the Australian Government Department of Climate Change and Energy Efficiency in July 2013. The Factors in use are the same as those used in previous energy survey reports to provide reporting consistency.

For solid organic waste, a conversion of 1.2X is applied i.e. every tonne of organic green waste equates to 1.2 tonnes of CO₂ emissions. This conversion factor is based on green waste. This conversion factor may not be directly applicable to the solid waste produced by the stockfeed manufacturing industry but at this stage is the best available.

Solid Organic Waste for 2016 the average waste removed from sites was 1.4kg/tonne of finished feed.

Solid Organic Waste	kg/tonne finished feed
Lowest	0.24
Average	1.38
Highest	2.66

4. Carbon Emissions

The lowest CO₂ emissions come from the manufacture of mash feeds. There is a large range in CO₂ emissions for mills having pelleting capability, with mill volume and manufacturing efficiency being a major contributing factor.

Carbon Emissions	kg/tonne
Average CO ₂ mash only mill	4.4
Lowest CO ₂ mash/pellet and pellet only mills	15.3
Average CO ₂ mash/pellet and pellet only mills	36.5
Highest CO ₂ mash/pellet and pellet only mills	53.3

5. Water Use is greatest for use in boilers and pelleted feed manufacture.

Water Use	litres/tonne finished feed
Lowest	62.5
Average	99.9
Highest	121.0

DISCUSSION

This is the fifth year of energy use data collection for Australian feed mills. The following comparison table provides the average mill data for 2012 to 2016. This data does not distinguish between mash and pellet feed mills.

	Average mill taking part in survey				
	2012	2013	2014	2015	2016
Feed volume - tpa	58,411	93,974	83,229	93,336	111,440
Electricity use - kWhrs/tonne	25.20	25.35	23.60	27.00	27.20
Gas use - GJ/tonne	0.180	0.184	0.179	0.192	0.190
Total energy use - GJ/tonne	0.260	0.257	0.265	0.280	0.300
Water use - litres/tonne	87.7	77.1	88.6	88.7	99.9
CO2 emissions - kg/tonne	35.1	32.0	32.2	36.8	36.5

The 2016 survey had less mills taking part, with only one mash mills supplying data. There was an increase in the average size of mills submitting data.

Average electricity use has increased, however this is a function of an increased percentage of pelleted versus mash feeds from the companies submitting data.

Gas use in the 2016 survey is similar to that for 2015, where boiler operation for steam pelleting is the major use.

Total CO2 emissions for 2016 is similar to the 2015 data.

The limitation with the survey is in having an inconsistent set of mills submitting data. Although data has come from the manufacture of 3.23 MMT, the SFMCA members manufacture over 5.5 MMT. In particular the 2016 survey has not captured data from the mash feed mills operating as well as smaller mills pelleting feeds. Based on the decline in mills participating, future energy surveys are subject to SFMCA being able to gain greater involvement of members. Based on the outlook for rapidly rising energy costs, it would seem that this could act as a stimulus for more companies to take part in future surveys.

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Further Information: Enquiries relating to this report should be directed to John Spragg, Executive

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