Electricity Supply Issues for Farmers

Report to the Consumer Advocacy Panel

February 2013
metá - (prefix): *sense of change of position or condition, behind or after, beyond, of a higher order* ...

**Disclaimer:** Meta Economics Consulting Group Pty Ltd strives to ensure the accuracy and value of information contained in its reports and other analysis. However, due to the subjective and incomplete nature of some information, and changing knowledge, valuations and perspectives, readers should apply their own judgement with respect to the analysis and advice offered in this report. Meta Economics Consulting Group Pty Ltd offers no warranties with respect to the information and analysis contained herein, or the outcome of decisions taken on the basis of that information or analysis.
Acknowledgements

This project was funded by the Consumer Advocacy Panel (www.advocacypanel.com.au) as part of its grants process for consumer advocacy projects and research projects for the benefit of consumers of electricity and natural gas.

The views expressed in this document do not necessarily reflect the views of the Consumer Advocacy Panel or the Australian Energy Market Commission.

Meta Economics Consulting Group
February 2013

For further information about this report please contact:

Terry Ryan
The Old Bakery
25 Cork Street
Gundaroo
NSW 2620
T: 02 6236 8282
M: 0413 701 932
E: terry.ryan@optusnet.com.au OR
   ryan@metaeconsult.com.au
## Contents

### Executive summary
Survey overview ................................................................. 1
Power failures and quality ..................................................... 2
Resolution of problems .......................................................... 2
Notification of outages .......................................................... 3
Costs of power failure ........................................................... 3
Provision of infrastructure ..................................................... 3
Dairy industry ................................................................. 4
Poultry industry ............................................................. 4
Western Division of NSW .................................................. 5
Farm organisation advocacy ................................................. 5
Adaptation ........................................................................ 5

### Chapter 1  Electricity usage in Australian agriculture
1.1 Broadacre and dairy industries ............................................. 7
1.2 Other agricultural industries ............................................... 10
1.3 Importance of reliability to farm electricity supply .................. 12
1.4 Number of farmers in NSW ................................................ 14
1.5 Survey database for electricity study ..................................... 16
1.6 Findings ....................................................................... 17

### Chapter 2  Industry survey results
2.1 Costs of power failure ..................................................... 20
2.2 Power failures and quality ................................................ 26
2.3 Resolution of problems .................................................... 29
2.4 Notification of outages .................................................... 30
2.5 On farm generators ........................................................ 31
2.6 Provision of infrastructure ............................................... 31
2.7 Findings ....................................................................... 33
Chapter 3   Electricity usage in the dairy industry
3.1 Power outages .......................................................... 34
3.2 Incidence of power problems ........................................ 35
3.3 Notification of outages .................................................. 36
3.4 Power failure: costs and backup generation ..................... 36
3.5 Complaints ................................................................... 39
3.6 Findings ......................................................................... 39

Chapter 4   Electricity Usage in the Australian Poultry Industry
4.1 Incidence of Power Problems .......................................... 40
4.2 Power Failure: Costs and Backup Generation .................. 42
4.3 Quality of Service and Communication: Notified Outages and Complaints.............. 43
4.4 South Australian Developments ....................................... 45
4.5 Findings ......................................................................... 45

Chapter 5   Electricity usage by farmers in the Western Division of NSW
5.1 Comments .................................................................... 49
5.2 On-farm generation ........................................................ 50
5.3 Infrastructure ............................................................... 51
5.4 Costs ............................................................................. 51
5.5 Findings ......................................................................... 52

Appendix 1
Case Study: Australian electricity supply standards and international equipment standards ................................................................. 53

References ............................................................................. 56
Executive summary

There is very little information on the issues facing farmers in their electricity supply in the National Electricity Market. This is due to a paucity of information in the public domain. To help fill this gap, a survey and meetings were organised with the assistance of the NSW Farmers Association, a member of the National Farmers Federation.

The information for this study came from a number of sources. An Internet survey was placed on the NSW Farmers Association website and collected from postal and fax responses and meetings with groups of farmers. Comments on issues were sought from farmers as well as statistical information. Details of information sources are provided in Chapter 2.

Analysis of existing statistical databases provided the following findings:

- At a state level, broadacre and dairy industries consumption patterns do not vary significantly between the states. New South Wales can be used as a basis for comparison of electricity industry consumption patterns because it is similar to most other states.
- There is not a significant divergence between the different agricultural zones in NSW. For broadacre industries across zones, electricity consumption as a proportion of farm cash operating costs is relatively similar ranging between one and two percent.
- There is not a significant divergence in consumption patterns relative to farm cash operating costs by region in NSW.
- For broadacre farmers, as size increases electricity consumption as a proportion of operating costs diminishes.
- Within the category of broadacre farms, the livestock industries are relatively more electricity intensive than the cropping industries.
- The long-term trends for dairying electricity costs fell but are now rising and have been doing so over the last few years.
- For broadacre industries, a similar pattern can be observed but to a lesser degree.
- The dairy industry is a much more electricity intensive industry than broadacre industries.
- The poultry industry is the most electricity intensive of all agricultural industries.

NSW serves as a benchmark for all jurisdictions in the NEM.

Because of the importance of electricity reliability to the poultry and dairy industries, separate case studies have been developed for them. Focus has been placed on the Western Division as an outlier example of remote electricity supply to farmers. It provides the most extreme cases of difficulties in electricity supply to farmers.

Survey overview

Statistics were collected from the surveys, however care should be taken in interpretation, as there are qualifications relating to population size and the degree of ‘randomness’ in sampling of farmers on the issues.

The findings on this aspect of the study are:

- There are differences in the definition of farmers from different agencies which lead to major divergences in the number of farmers reported by the different agencies.
- The database of respondents was built from multiple sources and was not a truly random selection. The respondents to the NSW Farmers Association Survey were self-selecting and...
were therefore more likely to have had an interest in the issues because of experienced problems.

- Though the total number of respondents could be used to derive some statistics, caution should be used because of these self-selection problems. However, the responses can be used to provide indications of potential areas of problems and general satisfaction with the electricity supply distribution network as it applies to farmers.

There have been some previous studies looking at the value of customer reliability for different classes of consumers including farmers. The findings of those previous studies were:

- Farmers value reliability of electricity supply more than most other broad groups of consumers.
- Surveys demonstrated that despite this, most farmers were not willing to pay significant sums to improve their reliability standards.

For farmers generally across NSW there was a mix of respondents from industries and regions. A series of questions were put seeking empirical answers and any further comments on issues from farmers. A summary of the major results from the questions for agriculture in New South Wales follows.

**Power failures and quality**

The information obtained indicates that the number of power failures is greater than the statistics reported by Essential Energy in their Annual Report. However there are cautions with the statistics collected as survey respondents were self-selecting and there is the likelihood that they were a subgroup more adversely affected by power failures than the average of all farmers. Also there were some significant outliers where respondents reported power failures on more than 100 occasions per year. All these extreme frequency of unnotified outages were for short periods. In the survey questionnaire they were answered in the less than six hour period. There was no question on momentary or very short outages. Adjustments were made by excluding these extreme outliers from the calculation of the mean number of power outages and this significantly reduced the result. Even with this mean there were still other respondents who cited that their number of power outages were in the order of 40 to 60 times per year. An explanation for this extreme number was put by one farmer at a meeting that there were a very large number of momentary outages that were picked up by some of the equipment that the farmer used.

For the number of power surges and voltage drops/brownouts, there were again some extreme outliers amongst respondents. Adjusting the statistics by excluding the extreme outliers significantly reduced the average impact on farmers from 17 power surges per year to 4 and the number of voltage drops from 12 to 6. Again the extreme numbers of these power reliability problems could arise from the types of equipment being used by farmers.

**Resolution of problems**

Nearly a third of all survey respondents had made complaints about their electricity supply and of those who made complaints half of those had them satisfactorily resolved. Again as a self-selecting survey group, these farmers would most likely be the ones who have had problems and as stated by farmers, there was no response to their complaints in many cases. The nature of the complaints is unknown.
Notification of outages

Periods of notification for planned outages were initially flagged in preliminary interviews with the NSW Farmers Association as a potential area of problems. Specific questions were asked on the issue.

The finding on this point was:

For notified outages, farm customers were generally satisfied with the service notification provided.

Costs of power failure

Respondents provided statistics on the categories of losses from power failure in their operations. There were fewer responses providing detailed estimates of the actual costs that have been or could be incurred from power failures. More detailed estimates were provided by poultry farmers. Estimating average costs for farmers from power failures would be difficult statistically, because of the low number of responses. But the indicative numbers are provided for the costs of individual categories of losses from power failures.

Indicative costs have been provided for the following categories:

- costs of operating backup electrical equipment
- loss of livestock
- loss of produce
- damage to equipment
- paid staff unable to work
- costs to bring farm back to normal operation
- pumps needing to be primed
- problems with failure of electric fences
- loss of water from pump failure.

Some of the costs could not be estimated due to the impact being of a cumulative nature and in other cases due to inconvenience rather than actual financial cost. There were also cases such as loss of take or pay irrigation water where no estimates were provided.

As a self protection mechanism, a very large proportion of farmers did maintain some on farm generation capacity. More than three quarters of all farmers stated that they had on farm generators. The importance of this for self insurance is further investigated in the case studies for poultry and dairying.

Provision of infrastructure

This issue was raised by NSW Farmers Association in discussions as there were concerns about the ability to obtain contestable quotes and with confusion as to who is responsible for certain parts of the infrastructure, such as the poles. The survey information indicated an approximately equal split between those who had problems in certain areas and those who had no problems. Other issues raised in the comments and at meetings related to the regulatory and certification requirements for the installation of infrastructure which were said to impose higher costs in rural areas because of distances and lesser competition for the provision of infrastructure.
Dairy industry

The findings from this case study were:

There were no significant differences in policy issues or in the types of problems to be addressed between dairying and the other broadacre industries.

Dairy farmers raised the issue of a priority list for service difficulties. As dairy farmers are highly dependent upon the regularity of power supply, especially at specific times of the day, it would be worthwhile to consider including dairy farmers on a priority list where they have nominated the times of day during which it is essential they have power supply. Any additional charges for this service would need to be negotiated between the parties.

Notwithstanding the development of a priority list with consequent price signals, the effects of power outages on the industry are severe enough to warrant some degree of self-insurance to minimise the impacts on the farms operations. As noted this is recommended by Dairy Australia.

Poultry industry

The poultry industry case study showed how dependent the industry is on reliability of supply. This group also boasts the greatest electricity use as a proportion of operating costs. The sensitivity of the production in this industry leads to significant losses from even short outages. Consequently, this industry requires a significant amount of self-protection. All farmers had their own generation backup to cover power outages.

The farmers in this industry take a greater interest in electricity supply issues than farmers in most other industries. Their issues and knowledge of the power supply industry interface with farmers also provided scope for other farmers in other industries to learn methods of minimising power supply problems.

This exposure to greater reliance on electricity as a critical input provided information that could be used by other farmers facing similar issues but on a smaller scale. There were other aspects of adjusting to power issues where farmers had found means of minimising the inconveniences and problems caused by power reliability that could be used by all farmers.

Specific findings for the poultry industry include:

It is essential that poultry farmers have their own electricity backup as the scale of potential losses from power failures is extremely high.

The findings for the poultry industry which can be applied across all agriculture are:

There is scope for improved technology to reduce the nuisance aspects of power supply to their operations such as momentary outages.

There is a need to investigate the means of ensuring imported equipment is not damaged by electricity supply problems and what the level of responsibility is for the distributor in meeting appropriate standards.

This issue arose in the poultry industry case study but has application across all agricultural industries.

As raised earlier in the general agricultural chapter, there is scope for investigation in investigating better methodologies and approaches for metering of supplies to farmers.
There appears to be contradictory information and views amongst farmers as to what is contestable supply and what is monopoly provision as evidenced in the view of “are rack rates negotiable”.

The poultry industry is different in some aspects to most other farmers in that some require high voltage supply which comes under different arrangements to most farms where three phase is normally the highest level of supply required.

**Western Division of NSW**

The Western Division of NSW Case study illustrates the problems for farmers in remote locations with very thin networks. The findings in this study were:

- Farmers in the pastoral zone of the Western Division are generally happy to have access to grid power primarily for quality of life issues.
- The single wire earth return system does create some problems for the operation of their farm equipment in particular and many have found ways of adapting to the system in place.
- There are some unusual facets that deserve further investigations such as the standing costs and new infrastructure costs that deter further usage of the existing electricity infrastructure in place.

**Farm organisation advocacy**

The farm organisations in their representative role for farmers have the scope to address most of the identified issues from this study. For many of the issues raised by farmers, information dissemination can help address the problems. The means to address this issue should be determined by the farm organisations in consultation with the components of the electricity supply industry.

The specific findings for consideration by farm organisations in an advocacy role are:

- There is confusion about the responsibilities between the service provider, the retailer and the customer
- There also appeared to be concerns about who is responsible for ensuring the adequate provision of appropriate infrastructure
- There are concerns about delays in having new infrastructure approved by the distributor
- The distinction between the levels of contractors can impose additional costs and there is scope for investigation of appropriately meeting safety standards at a lower cost to farm consumers by reassessing responsibilities for the electrical contractor levels

The above issue is for research and negotiation between the appropriate parties to try and reduce cost pressures whilst ensuring the integrity of the system.

**Adaptation**

There is scope for farmers to adopt practices that other farmers have developed to minimise the impact of power reliability problems. Examples that have been put forward by some farmers include use of self priming pumps and adapting and programming equipment to minimise the impact of momentary outages.

Progress could be made on this through consultations between the distributors and the farm organisations.
Chapter 1  Electricity usage in Australian agriculture

The importance of electricity as an input into Australian agriculture is examined in this chapter. The focus will be on electricity’s relative input cost, and the importance of reliability in agriculture.

There are detailed statistics provided from ABARES surveys on usage of electricity by the sector, within broad aggregate industries, and by state and zone. However, information on usage within industries not covered by the ABARES surveys is more limited.

Agricultural industries in NSW are examined and compared with the comparable industries in other states, where the data is available. This allows an assessment of the industries and regions in New South Wales as a possible benchmark for electricity consumption issues for farmers throughout Australia.

The agricultural sector is a relatively minor user of electricity as shown in Figure 1.1. The industry accounts for less than one percent of total electricity consumption, a tiny share given the value added by the sector to the economy.

Figure 1.1  Electricity consumption by sector (PJ)

Source: BREE, Energy in Australia 2012
1.1 Broadacre and dairy industries

As shown in Figure 1.2, electricity is a relatively minor input as a proportion of cash costs for broadacre industries and dairying. The data is for 2011, the latest year available from the survey information. There are divergences between the states with Tasmania having the highest electricity consumption in broadacre, though it is not significantly different from the other states. In all cases dairying is much more intensive in its use of electricity than broadacre agriculture. New South Wales is similar in its relative usages of electricity for broadacre and dairying as for Australia generally.

**Figure 1.2 Electricity consumption as a proportion of farm variable costs by State - broadacre and dairy: 2011**

For the New South Wales major agricultural zones, dairying and the generally remote pastoral zone have greater consumption of electricity as a proportion of farm costs than major agricultural activities generally, as shown in Figure 1.3.
By region (within New South Wales), a similar story is told with the far west (pastoral zone) showing higher consumption than most other regions. Dairying is more predominant on the coast, but there are also many other agricultural activities and the region does not stand out as a very high usage region.

**Figure 1.4**  Electricity consumption as a proportion of farm variable costs by region, NSW: 2011

Source: ABARES 2012
Figure 1.5 shows the trends in electricity consumption in New South Wales for broadacre and dairying industries since 1990. For broadacre agriculture, generally electricity costs as a proportion of total cash costs have generally been in the range of 1 to 1.5 percentage points of total cash costs, never exceeding 1.5 percentage points. Electricity usage in dairying is significantly higher as a proportion of total cash costs compared to broadacre industries and has shown a rising trend over the last 4 years though previously having a declining trend.

**Figure 1.5**  **Trends in electricity consumption as a proportion of variable costs: NSW broadacre and dairying**

The survey data on broadacre farms by size from ABARES in Figure 1.6 shows clearly that electricity consumption as a proportion of total cash costs varies inversely with the size of the operation. This indicates that the household consumption component of smaller farms is relatively higher than for larger farms, and there appear to be economies of scale in electricity usage for larger scale agricultural operations.

**Figure 1.6**  **Electricity consumption by farm size- broadacre 2011**
The data in Figure 1.7 again shows the importance of electricity usage in the dairy industry relative to all other broadacre industries.

**Figure 1.7 Electricity consumption as a proportion of farm variable costs by broadacre industry and dairy: 2011**

Source: ABARES 2012

### 1.2 Other agricultural industries

ABARES survey information is not generally available for other small agricultural activities, with the exception of specific one-off surveys, such as those for the vegetable industry. However there is information from farm budget data developed by State Departments of Agriculture which provide indications of electricity usage in these activities. Other smaller industries, such as the pigmeat industry and the honey bee industry are similar to the major broadacre and dairying industries in terms of their electricity usage as a proportion of farm cash operating costs. However, it should be noted that the chicken meat industry is the most electricity intensive agricultural industry. The pigmeat industry is also similar in that it is feed and housing intensive, but demonstrates much lower electricity consumption requirements. These other industries are shown relative to broadacre and dairying on the same basis.
Information on the importance of electricity as a proportion of variable costs is available on a more disaggregated level for the production of various vegetable crops, as shown in Figure 1.9. Nearly all the crops demonstrate a range of 1 to 3 per cent for electricity as a proportion of total variable costs. The exception is carrot production, where electricity accounts for over 5 per cent of total variable costs.

Horticultural producers indicated that their major electricity consumption was for cool rooms and was seasonally based.
1.3 Importance of reliability to farm electricity supply

For many agricultural activities, the volume of electricity available is a far less critical consideration compared to the reliability of that supply.

**Previous studies**

There have been a number of studies undertaken that provide indications of the importance of electricity supply reliability to Australian farmers.

VENCorp commissioned studies to measure the value of customer reliability (VCR) for six customer sectors including agriculture. These studies were only to assess the value of reliability from minimising the number of blackouts. The studies were primarily investigating reliability through the transmission sector of the electricity industry and were not based upon problems at the distribution level.

The studies did not deal with voltage spikes or drops. The studies were based upon surveys of respondents in the different sectors and assigned values per kilowatt hour of lost load. A series of suggested measures of losses for individual consumers in the different categories were provided in the surveys. As shown in Table 1.1, the value placed on losses by the agricultural sector was the highest of all the measured sectors at $111 per kilowatt hour of lost load. Error bands on reliability were provided, but these were minimal for agriculture at plus or minus $0.51 per kilowatt hour.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Sectoral value of customer reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>13.25</td>
</tr>
<tr>
<td>Agriculture</td>
<td>111.06</td>
</tr>
<tr>
<td>Commercial</td>
<td>90.76</td>
</tr>
<tr>
<td>Industrial</td>
<td>36.07</td>
</tr>
<tr>
<td>Total</td>
<td>48.75</td>
</tr>
</tbody>
</table>

Source: CRA 2008

A summary of studies undertaken to measure the value of customer reliability in Victoria for different classes of users is presented in Table 1.2. In all cases agriculture values reliability more highly than other classes of users, excepting commercial users.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>0.74</td>
<td>11.87</td>
<td>13.12</td>
<td>16.33</td>
</tr>
<tr>
<td>Agricultural</td>
<td>75.93</td>
<td>56.7</td>
<td>90.65</td>
<td>114.68</td>
</tr>
<tr>
<td>Commercial</td>
<td>95.75</td>
<td>55.75</td>
<td>131</td>
<td>134.15</td>
</tr>
<tr>
<td>Industrial</td>
<td>11.19</td>
<td>18.54</td>
<td>36.32</td>
<td>45.94</td>
</tr>
<tr>
<td>Total</td>
<td>28.89</td>
<td>29.6</td>
<td>47.85</td>
<td>60.18</td>
</tr>
</tbody>
</table>

Source: Hickling 2010
The following observations were made in the report about the reliability impacts on the agricultural sector in Victoria:

The impacts of an interruption are more critical to this sector in the warmer spring/summer months than at other times of the year. 59 per cent of respondents said that interruptions have the same impact regardless of the day of the week they occur. Of these weekday interruptions tend to be more critical than weekends.

Almost 65 per cent of these respondents nominated a weekday as the worst time of the week to experience a power interruption. The most critical time during the day for a power interruption to occur is between 6 am and 6 pm.

A report for the Australian Energy Market Operator provided estimates for other states. Estimates for agriculture specifically were only available for South Australia and the previously noted study for Victoria. The full summary of results is provided in Table 1.3.

### Table 1.3 Values of customer reliability by sector and jurisdiction ($/kWh)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Victoria</th>
<th>Queensland</th>
<th>NSW</th>
<th>South Australia</th>
<th>Tasmania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>20.395</td>
<td>15.318</td>
<td>17.190</td>
<td>16.469</td>
<td>18.532</td>
</tr>
<tr>
<td>Agricultural</td>
<td>111.062</td>
<td>na</td>
<td>na</td>
<td>133.493</td>
<td>na</td>
</tr>
<tr>
<td>Industrial</td>
<td>36.074</td>
<td>31.427</td>
<td>32.055</td>
<td>32.905</td>
<td>34.157</td>
</tr>
<tr>
<td>Statewide</td>
<td>50.258</td>
<td>37.198</td>
<td>35.085</td>
<td>38.037</td>
<td>42.022</td>
</tr>
</tbody>
</table>

Source: Hickling 2010

For the South Australian results, the study noted:

“In this regard it is interesting to note that, in aggregate, while survey results indicated that customers were willing to pay something for electricity reliability improvements, it was not much.”

and

“rural customers having the lowest willingness to pay for outage frequency reductions despite having the highest actual outage frequency.”

However, the study found that rural customers reversed their priority for long duration blackouts. The study noted that:

"Willingness to pay for the longest interruption of the year to be reduced by 1 hour was similarly marginal. Small business and rural customers exhibited the highest willingness to pay for this service improvement at 0.4 per cent of their annual bill each."

This study does not attempt to measure the value of customer reliability for agricultural customers, but to find the relative impacts on different components of agriculture of reliability issues and the potential issues and implications for farmers and electricity distributors.

Some of the questions in the survey of farmers focused on the reliability requirements for the different types of agricultural enterprise. This included the costs (both direct and indirect) for these enterprises and the impacts of frequency and duration of reliability problems for farmers.

The survey was also designed to discover the contingencies farmers have in place to deal with these problems.

The costs to the sector as a whole or to the specific types of agricultural activity have not been estimated.
It should be noted that the supply of electricity to farmers is generally at a higher cost than for most other categories of consumers, primarily because of the length and thinness of the networks supplying them. More infrastructure is provided per customer, on average, than most other small business or residential customers because of this network costing.

**1.4 Number of farmers in NSW**

As part of the data gathering exercise for this project, a survey was conducted of farmers to provide an empirical base on the issues. For the survey results, it is desirable to know the target population size of farmers in New South Wales. This is not as straightforward as would be expected due to the numerous measures of the number of ‘farmers’ depending upon their source and usage. These differences can be extremely significant.

Examples of the different definitions and consequent numbers are:

- there are about 135,000 ratepayers to the Livestock Health and Pest Authorities, who must have a minimum rateable area of 10 ha in the eastern divisions of the state and 40 ha in the Western division
- there are over 43,000 farmers according to the Australian Bureau of Statistics, who use a definition based upon having a value of output of greater than $5000
- there are under 18,000 farmers in the broadacre industries according to the ABARES definition (below).

Different definitions were used previously by ABARES and the ABS until 2005 when ABS undertook the task of defining the number of farmers. The ABS definition (which used a value of output of greater than $5000) increased the number of farmers in Australia by approximately 20,000 compared to the ABARES definition (which used $22,000 as the cut-off). ABARES had 15 percent fewer farmers in Australia than did the ABS.

Partial indicators to try and provide a more definite picture provide additional information that indicate that many of the farmers are part-time or hobby farmers, or even rural residential with the occasional livestock. Of the 43,000 farmers in NSW according to ABS:

- over 25,000 used fertilisers
- nearly 35,000 grazed stock

However, other partial indicators suggest that these could be overstatements of the number of full time commercial farmers

- less than 8000 undertook soil testing for determining fertiliser usage
- just under 18,000 have never used forage or pasture budgets for their stock

These partial indicators demonstrate that the number of farmers keeping up with technological and market advances to maintain or maximise profitable production is a relatively small population of the total number of designated farmers

The ABS data on the composition of farms by gross receipts in the broadacre industries in NSW is shown in Figure 1.10. From farm budget data, it is extremely unlikely that anyone with gross receipts of less than $100,000 from broadacre agricultural activities would be able to make a full-time living from those activities after meeting the costs of running the enterprise. If this adjustment is made to the number of broadacre farmers it reduces the full-time number of farms by about one third compared to the official statistics.
There are significant differences in the estimates of population sizes for the different categories of agricultural production. The ABARES sample sizes for the different categories of broadacre and dairying farmers by gross receipts, and the proportion of the estimated population sizes, is shown in Table 1.4. The dairy sample size was 72 in 2005 and has increased to 77 in the latest year 2012. This is after the reduction in the number of dairy farmers noted earlier from 1397 to 827 currently. For broadacre farmers, the sample size proportion varies from less than 1 per cent to nearly 5 per cent of the farmers in the different income categories.

Table 1.4  Population and sample sizes - ABARES surveys

<table>
<thead>
<tr>
<th>Size</th>
<th>Population</th>
<th>Sample</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $100,000</td>
<td>5907</td>
<td>38</td>
<td>0.64 per cent</td>
</tr>
<tr>
<td>$100,000 - $200,000</td>
<td>3472</td>
<td>42</td>
<td>1.21 per cent</td>
</tr>
<tr>
<td>$200,000 - $400,000</td>
<td>3943</td>
<td>69</td>
<td>1.75 per cent</td>
</tr>
<tr>
<td>More than $400,000</td>
<td>4684</td>
<td>231</td>
<td>4.93 per cent</td>
</tr>
<tr>
<td>Dairy</td>
<td>827</td>
<td>77</td>
<td>9.31 per cent</td>
</tr>
</tbody>
</table>

Source: ABARES 2012
**Agriculture in perspective**

No matter what measure of farmers is used, they account for a small proportion of the total number of customers in rural New South Wales. Though all the distributors service farm customers, Essential Energy contains the great majority of full-time farmers.

A statistical overview of the major rural distributor in NSW, Essential Energy, shows that it has more than:

- 800,000 customers
- 200,000 km of powerlines
- 1.4 million power poles
- 135,000 distribution substations.

Many of the issues facing farmers as electricity consumers are similar to those facing most other residential and small business consumers. Issues such as notification of outages and handling of complaints are common to all classes of consumers. The geographical dispersion of farmers and thinness of the network serving them can also lead to greater issues with power reliability.

The provision of mains electricity to most farmers is a very high cost provision of supply compared to most other consumers. There is usually a greater provision of infrastructure for farm consumers, especially on Broadacre farms, where the distances between consumers are much greater than in urban areas or country villages. By this very geographical nature, provision of mains electricity and the consequent servicing and maintaining the integrity of the supply will be much more expensive. If there should be a major problem in an area, due to weather or other such incidents, the repair or maintenance of the infrastructure in more densely populated areas will bring more consumers online more quickly than if priority is provided to customers who are on remote lines with very few consumers running off those lines.

In developing advocacy and policy positions on the electricity supply for farm consumers, it is essential to recognise these geographical and economic facts.

### 1.5 Survey database for electricity study

The database on electricity industry issues for farmers was built up from multiple sources. There was a consistency in the questions asked, but the results were sourced from a range of means by which farmers could respond.

An Internet survey was conducted from the NSW Farmers Association website. They have previously conducted a number of Internet surveys of the members to obtain information on their views and for empirical purposes on a variety of policy issues. The survey was publicised amongst their senior elected officials, their Journal to members, and regularly in their weekly update newsletter to their members. Two radio interviews which were networked around rural New South Wales were also conducted to encourage participation in the survey.

Members of the New South Wales Farmers Association were also given the opportunity to post or fax in their responses if they did not have Internet access or did not want to submit over the Internet. There were 75 responses through the Internet survey, and a further 12 responses from posting or faxing.

The responses from members of the NSW Farmers Association were self-selecting as to whether they answered the survey questions.

Responses were also sought and obtained at various public meetings which were targeting specific regions or industries for case studies on electricity industry issues.
These meetings included:

- A meeting of the Western Division Council at the Sydney Showground. This was an opportunity to meet a representative sample of farmers covering 40 per cent of NSW. The meeting in Sydney was the best place to get coverage of all areas of the Western division, as the farmers stated that it was generally more difficult to get widespread participation from all areas of the Western Division if a meeting was held in that region.
- A meeting with representatives of the Western Division in Dubbo
- Representatives of the dairy industry from all areas of NSW were met at the Annual General Meeting of the Dairy Farmers section of the NSW Farmers Association. This meeting was held at the Dairy Research Station of the University of Sydney at Narellan.
- Meetings with individuals or small groups of dairy farmers on the North and South Coasts of New South Wales.
- Representatives of the poultry and egg industries from all areas of NSW were met at a technical field day held at Sydney Olympic Park. This was an industry wide function which included many participants from these industries who may or may not have been members of NSW Farmers Association.
- A meeting with poultry industry representatives in Sydney.

Additional responses were sought and obtained from farmers who were contacted in relation to a separate inquiry into agricultural policy issues relating to biosecurity. There was a significant response rate from these farmers who also may or may not have been members of NSW Farmers Association.

All these additional sources of responses were from significant producers in their respective regions or industries.

Other sources of information included current and former staff of distribution networks and private contractors in the electricity industry.

**1.6 Findings**

- At a state level, electricity consumption in broadacre and dairy industries does not vary significantly between the states. New South Wales as an example can be used as the basis for comparisons in electricity industry consumption patterns because it is similar to most other states and hence can be treated as representative.
- The dairy industry is a much more electricity intensive industry than broadacre industries.
- The poultry industry is by far the most electricity intensive industry of all agricultural industries.
- There is not a significant divergence between the different agricultural zones in NSW. For broadacre industries electricity consumption as a proportion of farm cash operating costs are all relatively similar as they are all between one and two per cent.
- There is not a significant divergence in consumption patterns relative to farm cash operating costs by region in NSW.
- Previous studies show that farmers value reliability of electricity supply more than most other broad groups of consumers.
- However, the surveys demonstrated that most farmers were not willing to pay significant sums to improve their reliability standards.
The long-term trends for dairying electricity costs fell but are now rising and have been doing so over the last few years. For broadacre industries, a similar pattern can be observed but to a lesser degree.

For broadacre farmers by size, electricity consumption as a proportion of operating costs diminishes.

By category of broadacre farmer, the livestock industries are relatively more electricity intensive than the cropping industries.

The database of respondents was built from multiple sources and was not a truly random selection. The respondents to the NSW Farmers Association Survey were self-selecting and were therefore more likely to have had an interest in voicing their views because of experiences of problems.

Though the total number of respondents could be used to derive some statistical determinations, extreme caution should be used because of the self-selection bias. However, the responses can be used to provide indications of potential areas of problems and general satisfaction with the electricity supply distribution network as it applies to farmers.
Chapter 2  Industry survey results

The survey contained a question on the location of farmer respondents. The details of the location responses are shown in Figure 2.1. This indicates a broad distribution of respondents from throughout regional New South Wales. There was no over preponderance of any particular region which, because the respondents were self-selecting, could have indicated a set of specific regional problems. A comparison with the potential farmer populations is not readily available as the regions were based upon NSW Farmers Association regions which do not fully correlate with statistical regions or Natural Resource Management regions.

Figure 2.1  Regional response rates

The enterprises in which farmers identified involvement are presented in Figure 2.2. They cover all the major enterprises traditionally associated with agriculture in New South Wales and Australia. Poultry, dairying and the Western Division are overrepresented relative to their proportions of agricultural production as they were specifically targeted for case studies. These are the industries where electricity is a major input cost compared to most other agricultural industries and reliability issues were thought to be more important relative to other agricultural industries from early discussions with agricultural industry representatives. Reliability for dairying and poultry is a consistent issue whereas for many other agricultural industries this problem tended to be more seasonal. Fruit and vegetables were separately identified as industries. However, there was a very low response rate from members of these industries.
The other industries in which the respondents noted they were involved included:

- Silviculture
- Buffalo
- Oysters
- Native seed
- Flowers
- Irrigated Cotton
- Wholesale Nursery
- Goats

Only the major industries that respondents noted they are in, are included in Figure 2.2.

The data presented in the following sections excludes the responses from farmers in the dairy and poultry industries which are much more electricity intensive compared to most other agricultural industries. For this reason, these industries have been analysed separately. Responses in these industries were obtained from the Internet survey and from specific meetings and follow-ups. The Western Division farmers were also analysed in a specific case study as they face an electricity supply distribution network more extreme than most other agricultural activities in more intensively farmed areas of the state.

### 2.1 Costs of power failure

Questions were asked in the survey inviting farmers to estimate the costs of power failures on their farming operations. The data presented here excludes the responses from poultry and dairy farming industries which are covered separately in their case studies. Dairying and poultry are much more reliant than other agricultural sectors on reliability of power. Other sectors tend to have more seasonal requirements for most of their operations.
The categories of costs and the number of responses in agriculture excluding the two nominated industries are presented in Figure 2.3. A number of the responses indicated that they had costs from these categories but were not able to estimate effectively the costs incurred in their farming operations. For example, a number of farmers indicated that they would suffer losses from power failures due to the loss of take or pay irrigation water but none provided estimates of the actual levels of costs.

These costs should be treated as indicative of the scale of problems that are faced or potentially faced by farmers in these agricultural industries.

**Figure 2.3  Number of respondents by category**

From those respondents who did estimate costs, the results are presented in Table 2.1. The estimates are for the maximums and the mean average from those that responded with estimates of the costs. The high maximum for the loss of produce is skewed by one farmer relying upon coolrooms for his produce which would be spoiled with an extended power failure.

Respondents in some cases provided comments rather than numerical examples such as the number of litres of diesel use per hour in their backup generator and non-financial costs such as being unable to work or having to stay up to monitor the generator.

From the limited number of responses and the different effects on different farmers it is not possible to calculate the overall impact of power outages on the average farm. Table 2.1 provides the details of the possible ranges of costs on specific agricultural activities.
### Table 2.1 Indicative costs for power supply outages ($)

<table>
<thead>
<tr>
<th>Cost category</th>
<th>Max</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>2000</td>
<td>525</td>
</tr>
<tr>
<td>Costs of operating backup electrical equipment</td>
<td>5000</td>
<td>451</td>
</tr>
<tr>
<td>Loss of livestock</td>
<td>30000</td>
<td>5083</td>
</tr>
<tr>
<td>Loss of produce</td>
<td>50000</td>
<td>5190</td>
</tr>
<tr>
<td>Damage to equipment</td>
<td>35000</td>
<td>2866</td>
</tr>
<tr>
<td>Paid staff unable to work</td>
<td>5000</td>
<td>550</td>
</tr>
<tr>
<td>Overtime labour costs to make up lost production</td>
<td>13000</td>
<td>2400</td>
</tr>
<tr>
<td>Costs to bring farm back to normal operation</td>
<td>3000</td>
<td>645</td>
</tr>
<tr>
<td>Loss of take or pay irrigation water</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pumps needing to be primed to avoid damage</td>
<td>5000</td>
<td>825</td>
</tr>
<tr>
<td>Problems with livestock from the failure of electric fences</td>
<td>20000</td>
<td>1973</td>
</tr>
<tr>
<td>Loss of water for livestock from pump failure</td>
<td>5000</td>
<td>1291</td>
</tr>
</tbody>
</table>

**Irrigation water**

In the survey a number of farmers responded that the loss of take or pay irrigation water was a cost to their farm operations from problems with power supply reliability but none provided any detailed estimates of the costs they incurred.

As a means of providing indicative costs that could be incurred, the estimated electricity costs per ML of water from rivers are derived from New South Wales DPI data. The assumed cost of electricity for the different technologies is $0.30 per kilowatt hour. The estimated costs are provided in Table 2.2 on a per ML basis.

### Table 2.2 Irrigation electricity costs ($)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Electricity costs per ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furrow (river)</td>
<td>13.26</td>
</tr>
<tr>
<td>Pivot</td>
<td>54.3</td>
</tr>
<tr>
<td>Drip/jet spray</td>
<td>67.86</td>
</tr>
<tr>
<td>Spray (river)</td>
<td>74.64</td>
</tr>
<tr>
<td>Traveller (river), medium pressure</td>
<td>115.35</td>
</tr>
<tr>
<td>Traveller, high pressure</td>
<td>162.87</td>
</tr>
</tbody>
</table>
A comparison of the electricity costs per ML was also made with the NSW Government IPART determinations on what farmers have to pay for water from regulated rivers. The charges vary from river catchment to river catchment and also on the security level of access to the water. The highest and lowest costs for both high security water and general security water from the various river basins were chosen to provide indicative levels of the costs of water on a per ML basis to be compared with the cost of electricity on the same basis.

### Table 2.3 Irrigation water costs ($)

<table>
<thead>
<tr>
<th>Security level</th>
<th>Water costs per ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>High security(lowest)</td>
<td>6.4</td>
</tr>
<tr>
<td>High security(highest)</td>
<td>50.4</td>
</tr>
<tr>
<td>General security(lowest)</td>
<td>4.3</td>
</tr>
<tr>
<td>General security(highest)</td>
<td>41.5</td>
</tr>
</tbody>
</table>

Depending upon location, the security level and technology used for irrigation, there are significant differences in the relative costings of the water and electricity used for delivering that water. However, in nearly all cases the electricity requirements per ML of water are significantly higher than the water costs.

The comments from farmers about damage to pumps from problems with power reliability have been covered elsewhere. Specific comments were raised in relation to electricity supply for irrigation purposes and covered the pricing policies for electricity supply and their impact on irrigation specifically.

*This is not about reliability but if farmers are forced onto a DEMAND based tariff from the REGULATED tariff which happens when they exceed 160Mwhrs, their power bill will almost double without using any extra electricity. In my case it is possible I can use my irrigation pump for only 1.5 hours in a month using about $12.00 worth of power but get a bill for over $3000.00 for that month. Demand based rates for farmers who use power intermittently is an absolute disaster and is crippling financially.*

*I have no problem with the reliability of power, it is generally very good, my problem is the amount being charged for irrigation power supply when not in use. I receive a bill for $395 per quarter just to have the supply available, this is for 2 pumps, (one is a boost pump located further along the irrigation line). I think this is outrageous, it jumped up with no explanation.*

Respondents provided a number of comments in an open ended question on power supply reliability and its impact on their farming operation. Detailed are selections of the comments on specific aspects of the costs imposed upon farming operations. Many of them explain the uncertainties in estimating the costs imposed from power supply unreliability.

**Equipment damage**

Equipment damage was highlighted as an area of concern and many mentioned that the impacts were cumulative over multiple episodes of power problems rather than from single impacts:

*The supplier refused to acknowledge the damage caused*

*Cannot run computers without UPS’s. We have blown 3 motherboards. We have to replace light globes at least twice a year. There is a constant flickering in the lights during most winter nights.*
Damage from surge/brownout through starter burnout on demand pumps, cool rooms, freezers and refrigerators, and also computer power supply

Equipment has been damaged but not needed replacing yet

Difficult to know damage to equipment by one event - compounds over time
difficult to really know costs - it is the time and inconvenience and the compounding damage to equipment over time that we find difficult to calculate

As the power is only off for short periods the only effect has been on the performance of our pumps that require 3 phases to operate.

the supply is much better than 10 years ago when voltages would be down to 195v causing compressor motor failure

As will be noted also in the specific case study chapters, farmers have adopted or implemented self protection measures surrounding their power supply other than through the use of generation backup.

Some of the problems faced by farmers can be minimised through the use of various technologies to enhance self protection from power problems and minimise inconvenience. For example there could be greater use of voltage sensing units coupled to timers to protect equipment and motors in particular from voltage variations. The restart periods would be at the farmers discretion based upon his experiences of the most common power problems and their duration.

**Financial costs**

My Generator has run up 100 hrs in a year

Have generator for some processes, but it can't handle the large coolrooms. Coolroom failure means damage to the vase life of the flowers, which damages reputation rather than purchase price

Many farmers stated that they faced costs but were unable to provide detailed estimates. Reasons given for this included:

Difficult to calculate when you are away working, returning to find power has failed.

Costs very difficult to estimate. Operation of our own generation systems during power supply outages is how we survive

Hard to put a figure as it is a time factor of checking and rechecking that systems like fences are back in operation.

One farmer made the point that it was not just financial losses that he could face but also emotional stress as reliability of electricity supply for pumping stock water is critical, especially in summer, as it was possible for his stock to die, as he termed it "horribly from dehydration"

Not all the comments by farmers were very negative as to the extent of the problems they face from power reliability problems and some had adapted to potential problems such as the comment on using gravity feeds for water supply.
No problems

No serious problems

We don’t have these problems

I am generally satisfied with the reliability.

Reliability over the past few years has greatly improved

Supply is generally very good. Rectification of problems has been done promptly.

Our power supply has been more or less pretty consistent other than during major storms

I have no problem with the reliability of power, it is generally very good,

None of these really apply to me

Power failures have been short enough not to have affected us financially. All our pumps are installed to be self priming

Luckily the only water using electricity for pumps is for the houses.

The cattle are gravity fed.

The seasonality and specific time aspects and impacts of a power reliability issues is well demonstrated by these comments on the problems that have been faced or could be faced by farmers at shearing time as an example.

Shearing

If the outage occurred at shearing or crutching time the cost could be massive, $2000 to $4000 per day

Paid for two days shearing without power

Outage at shearing time would be disastrous

Luckily haven't had any blackouts during shearing/crutching etc over the last two years to cause problems, although we have in the past

Fencing

Electric fence necessary to keep stock from major road, office, household & workshop equipment easily damaged by power failures

Can't rightly say, but electric fencing is always the biggest problem, especially with goats. Also, all the meat in coolrooms, etc

Some of the comments demonstrated that there were difficulties in assessing financial costs and many of the problems are more labour intensive in terms of checking for problems.

Convenience

Checking that fridges and freezers are operational as loss of meat, vaccines and animal health products may have been spoilt
Continual brownouts, put in gas hotplates to cook. Sick of power issues.

Reset heater & timer

It is only an inconvenience to us

### 2.2 Power failures and quality

The responses on periods of power failures or blackouts were highly variable across regions, within regions and industries. 80 per cent of the respondents indicated that the periods of power failures or blackouts were for less than six hours. The numbers of power failures extending beyond 12 hours were reported by only 8 per cent of those responding. There were only three reports of power failures greater than 72 hours.

The number of power failures within the less than six hour category ranged from 0 to 100+. Some of the respondents stated in their comments that they determined these power failures by attributes such as touch lights coming on; or as in a Western Division example, blame was attributed to Single Wire Earth Returns for the very large numbers of power failures. Many of these could be for only a few seconds.

Many of these outages recorded by respondents are most likely outages which are reduced to only momentary interruptions due to auto-close devices being installed on the network to restore supply. The alternative to experiencing a momentary interruption would be an extended outage requiring supply to be restored by the distributor.

The mean number (or average) for all the respondents is provided in Table 2.4. An adjusted mean was also calculated excluding all respondents who cited 100 or more periods of power failures. This adjusted mean could be higher than the actual mean as there were still respondents included who stated that they had periods of power failures of the order of 40 to 60 times per year.

For power failure periods of greater than six hours, no adjustments were made as there were no extreme cases of numbers of power failures.

<table>
<thead>
<tr>
<th>Table 2.4 Period of power failures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Adjusted mean</td>
</tr>
</tbody>
</table>

As a comparison with the survey results, the reliability for two measures from the Essential Energy Annual Report for 2010-11 are provided in Table 2.5. The average duration was not picked up in the survey results but the average number of interruptions was. As shown in Table 2.4 they were significantly higher than those reported by Essential Energy. Divergences could arise from unclear recollections by survey participants or the self-selection of participants who may have results significantly higher than the average which would encourage their participation in the survey.
Table 2.5  Rural electricity performance indicators

<table>
<thead>
<tr>
<th></th>
<th>SAIDI</th>
<th>SAIFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short rural</td>
<td>245</td>
<td>2.38</td>
</tr>
<tr>
<td>Long rural</td>
<td>493</td>
<td>3.37</td>
</tr>
</tbody>
</table>

- **SAIDI** System average interruption duration index - Average total number of minutes that a distribution network customer is without electricity in a year (excludes interruptions of one minute or less)
- **SAIFI** System average interruption frequency index - Average number of times a customer’s supply is interrupted per year
- **Short Rural**: A feeder, which is not a CBD or urban feeder, with total length less than 200km
- **Long Rural**: A feeder, which is not a CBD or urban feeder, with total length greater than 200km

Responses were sought from farmers on the types of power quality issues that they faced. These targeted information on power surges and voltage drops or brownouts. As detailed in Table 2.6, there were very high counts from the total number of respondents indicating that the respondent farmers faced these quality problems regularly. The means were at very high levels for both power surges and voltage drops for these total number of survey respondents. These results were skewed by a small number of respondents who reported 100+ incidents. The small number of respondents had totals of up to daily occurrences according to their survey answers. Excluding the small number of respondents from the calculation of the average significantly reduced the number of incidents reported by farmers. Excluding them led to an average of four power surges and six voltage drops per farm on average.

Table 2.6  Survey results of power problems

<table>
<thead>
<tr>
<th></th>
<th>Number of power surges</th>
<th>Number of Voltage drops/Brownouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>99</td>
<td>111</td>
</tr>
<tr>
<td>Mean</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Adjusted mean</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

Open ended comments were solicited from survey participants on their specific power problems. A selection of these comments is provided.

**Comments**

**Weather**

The impact of weather on power reliability was noted by many survey participants:

*Generally pretty good - usually trees in wild weather*

*Almost everytime we have a storm or heavy rain*
Bad weather = power outs
Power failures occur often with bad weather

Regard the power supply as extremely unreliable especially during disturbed weather conditions. With prices continuing to rise, it would be appreciated if we had less power failures. People can be sent into space, yet we still have power failures whenever there a storm in the area.

**Aspects of power reliability**

There are comments on the general unreliability and the irritations caused for farm customers relating to this unreliability. Not all comments were negative about the provision of power supply to farm customers:

*Many occurrences of power coming on and off when being repaired - sometimes up to 4-5 times in one incident.*

*Numerous short interruptions some times more than once per week*

*Continual brownouts, put in gas hotplates to cook - sick of power issues*

*Some were several hours, some 2 seconds*

*It used to be many hours but now mostly short on and off flicks*

*Short outages are beyond reason, I have been in the process of moving to Wagga and have noticed that they don’t have anywhere near as many shortages (not even a tenth).*

*Since Essential Energy took over we have had a power outage once a week for 3 weeks.*

*4 of the failures of less than 6 hours came with one hour warning. There have been more outages than stated but were pre organised for line maintenance so were not included in the 15 failures*

*Better maintenance seems to be needed to power lines and substations*

*Power has not noticeably improved but less outages*

*Have had a good run*

*A high voltage fuse servicing a farming area would occasionally blow. Previously it took half an hour to fix. Now it takes approximately 2 hours as it has to be installed and then inspected by someone else*

**Power quality**

Apart from the outages, problems with the quality of supply of electricity and the impact on farming operations were another area of concern in the comments.

*Often power is too low to weld or run a number of tools at once*

*We have recently experienced phase failure. Origin Energy has inspected our load and installation - all were installed correctly. We have had Origin Energy place a recorder on our transformer. I suspect that as we are on a 4 feeder system and in a growth area that somehow not enough energy has been allocated to all 3 phases. We are monitoring the situation. The effect of having one phase drop has meant our pumps drop out and then try to keep starting - they then "blow" the phase failure unit and thermostats. All very costly to keep replacing. It is not the parts but the labour in having a technician come to the farm*

*We on a SWER system put in during the 1960s for 4 or 5 consumers. Today there over 36 consumers with the number rising. Voltages below the legal minimum are common.*
2.3 Resolution of problems

Questions were asked in the survey on how the electricity distributors resolved problems that farmer customers bring to them. The number of survey participants who made complaints to the distributors was approximately a third of all survey participants and numbered 53 in total. Of those, 27 said that their complaint had been satisfactorily resolved.

For those whose complaints were not satisfactorily resolved, a series of options for answering were provided and are detailed in Table 2.7. The number of those with their problems not resolved is less than those who indicated that their problem had not been adequately addressed as not all filled in the remainder of the questionnaire. No response and delayed response were the two most common forms of complaint by farmers about their dealings with their distributors.

Table 2.7: Survey results for responses to problems raised by farm consumers:

<table>
<thead>
<tr>
<th>No response</th>
<th>Delayed response</th>
<th>Inappropriate response</th>
<th>Problem not resolved</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>8</td>
<td>1</td>
<td>21</td>
</tr>
</tbody>
</table>

Survey comments

The survey allowed these respondents to again make any comments they wanted to on the resolution of any problems they had with their distributors. A selection is published below:

*Staff try to be helpful but the issues appear to be beyond their control and more associated with basic network design and insufficient resources for basic maintenance of infrastructure*

*Have complained about power quality for years with no response.*

*They have recently completed a hook up with a supply line coming from a different direction which has been in the pipeline for at least 5 years*

The issue of responsibility for clearing dead trees around power lines was raised. It was acknowledged that the distributors clear trees and foliage in proximity to power lines, but not for dead trees that could come down in a storm and cut the power lines. This included trees on public lands and not just those on private lands:

*Took 3 years to have trees overhanging powerlines removed*

*re brownouts - usual reply "someone must be using a welder" - this is a rural area with only 1 service per transformer - not a valid response*

*Waste of time complaining. The bigwigs know they have a monopoly and don't give a ….*

*Reliable 3 phase electricity is essential. Our 60 kw pumps do not work without it. This seems to be an allocation of supply problem. Did not occur under Integral but now occurring under change to Origin/Endeavour. Unsure who is responsible for supply. One says only the poles and the other says only for billing!*

One farmer made the observation that he had a power voltage issue on his establishment and the distributor (placed) a meter on his line to test for voltage fluctuations. However, no information was provided to the farmer.

Not all complaints were made formally and many issues were resolved:
Birds were taking out a line which had never happened before but it became a regular occurrence. The taking down of the line affected a series of properties further on that one line. The distributor eventually worked out a simple fix for the problem by putting rings on the wires to keep the birds away.

Another farmer stated that with new developments on his line the voltage supply to his farm dropped below acceptable levels. The distributor stated that he would have to pay for a new transformer even though it was a previously acceptable power supply but additional developments overloaded the system. He stated that this was eventually resolved satisfactorily.

### 2.4 Notification of outages

Farmers also provided information about the frequency of notified outages and the period of notice before they took place. Table 2.8 provides the details of the responses. Though there were some instances of notification periods of only one or two days, the two most common notification periods were a minimum of three days to 7 days and by far the most common was 7 to 14 days. There are also a significant number where more than 14 days notice was provided. The number of notified outages is a relatively small proportion of the total outages experienced by farmers, even after adjusting for the removal of the outlier cases as shown earlier in Table 2.4.

**Table 2.8: Notification of outages**

<table>
<thead>
<tr>
<th>Number of responses</th>
<th>(= 265)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>10</td>
</tr>
<tr>
<td>Count</td>
<td>109</td>
</tr>
<tr>
<td>Mean</td>
<td>9.5</td>
</tr>
</tbody>
</table>

**Findings**

For notified outages, farm customers were generally satisfied with the service notification provided.

**Table 2.9  Period of prior notification of planned maintenance or outages**

<table>
<thead>
<tr>
<th></th>
<th>1 day</th>
<th>2 days</th>
<th>3 to 7 days</th>
<th>7 to 14 days</th>
<th>more than 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>19</td>
<td>12</td>
<td>78</td>
<td>105</td>
<td>27</td>
</tr>
<tr>
<td>Min</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Max</td>
<td>2</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Count</td>
<td>19</td>
<td>7</td>
<td>31</td>
<td>37</td>
<td>12</td>
</tr>
<tr>
<td>Mean</td>
<td>3.1</td>
<td>2.8</td>
<td>7.5</td>
<td>9.1</td>
<td>4.8</td>
</tr>
</tbody>
</table>
2.5 On farm generators

Farmers were also asked if they had backup generators. They were asked the number of generators and the sizes. The majority of total respondents do have a backup generation and on average more than one generator. Details are provided in Table 2.10. It was not possible to calculate the average total generation capacity per farm as many did not respond with the sizes of their generators. They ranged from 1 kVA to 750 kVA. Many farms maintained multiple generators with some having variations in size of generators and others having multiple units of the same size. Some of the units were fixed for specific functions such as used in the milking shed while others were more portable units used for farm work outside the Homestead and machinery sheds. Overall there is significant generation capacity in the farm sector. As shown in the case studies for dairying and the poultry industries, there is a strong reliance on having backup generation capacity as the losses from power outages can be extremely high.

Table 2.10 On farm generator statistics

<table>
<thead>
<tr>
<th>Sum</th>
<th>161</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>112</td>
</tr>
<tr>
<td>Mean</td>
<td>1.4</td>
</tr>
</tbody>
</table>

2.6 Provision of infrastructure

A potential area of concern that was investigated in the survey was the contestability of the provision of infrastructure in rural areas. This issue had been raised in preliminary discussions with the NSW Farmers Association. Specific questions were asked in the survey. The results are presented in the following Table 2.11. Though from a limited number of respondents there was an approximate equal division between those who found that there were problems and those who had no problems.

Table 2.11: Identified infrastructure problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems in obtaining contestable quotes</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Problems with location of poles in paddocks</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Uncertainty of responsibility for poles</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>

Respondents were asked to give comments on the problems that they faced, if any, in the provision of this infrastructure. Following is a selection of comments from farmers to the survey:

Very slow in obtaining consent for a power reconnection

Took over 5 months to get a lifestyle (sic) transformer approved and installed, even though it was recognized as "very Necessary" at a new house site. In the meantime a $10000 air conditioner was severely damaged

Local provider wanted $990.00 just to give a firm quote when a private contractor gave a quote over the phone

Problems with metering
In the last 3 years we have invested over $350,000 on power infrastructure including poles 2 phase overheads and Bundles as well as transformers 15 KVA - 50 KVA Created necessary Easements with 88B Instruments turned over to Energy suppliers and now we get billed for Infrastructure Supply...What a Crock! The Energy supplier on sells power to other users using our Infrastructure ...Ripped Off

50 metre easement through 2 properties 1 unsalable 2nd loss of use with no compensation

we are currently trying to secure quote to upgrade a transformer etc and it is proving to be difficult to get straight forward information from the supply company about this...and finding electricians licensed to do this is also not so easy

I rang my provider to enquire about getting an upgrade to 3 phase power at one site. It is only 1-2 poles past an existing 3 phase set up. I was told that there was no additional capacity within the network to allow for it, and that I'd have to find myself a level 3? network designer (or something like that) at great expense to go any further. Why can't they look into it for me and just come back with a price? I don't know anything about upgrading the network or who to ask.

Why won't they provide quotes before any money is put down

We have installed a large solar panel system and Essential Energy were slow coming to inspect.

<table>
<thead>
<tr>
<th>Box 2.1 New infrastructure example</th>
</tr>
</thead>
</table>
| One farmer provided detailed information on the costings and issues in the installation of new infrastructure to a new house built on his property. The costs provide an indication of the additional capital costs that farmers face in connecting to the grid.

- Pole and transformer – $15,000
- additional pole – $5000
- remote meter – $3000
- cable – $3000

The farmer saved money on the total cost by undertaking the trenching of the cable himself with his own equipment.

An observation made by the farmer on his experience was that the contractor could not connect the power until it had been passed by the distributor. A fee had to be paid and inspection was required before connection could be undertaken. There were delays in this process after all the infrastructure had been installed before connection was undertaken.

The farmer used a level 3 electrical contractor. This level 3 contractor was not allowed to do any electrical work before the meter and could only undertake underground work on private property. A level 2 contractor was required to do any overhead work or underground work on public property. The different regulatory requirements for the two categories of contractors add additional costs especially in rural areas for electrical work undertaken. The farmer suggested that there could easily be an intermediate level of certification, a level 2.5 to undertake much of the work for his supply. The suggestion was that the level 2.5 had the skills to do the underground work on public lands and the preparation of the metering. This level contractor would not be working at heights and therefore there would be less safety requirements in terms of equipment which would also lead to cost savings.

The level 2 contractor (usually more expensive than a level 3 contractor because of the additional capital and other costs incurred) would still be used but for more limited work requirements on the farm.
The issue of metering was raised on a number of occasions. Issues concerned were the availability of types of meters, especially time of use meters, and the reading charges especially for back to base metering. It was stated that they were in the order of $1100-$1200 and the farmers said they could not see a justification for the cost.

One suggestion put forward was to provide a single metering point whereby there would be electronic meters measuring power usage at a base point.

Not all comments were negative:

*We had some concerns with a recently installed solar power generation unit, the call centre and middle management were the problem, the local staff were excellent in service delivery and assistance. Went smoothly*

### 2.7 Findings

- There is confusion about the responsibilities between the service provider, the retailer and the customer.
- There appeared to be concerns about who is responsible for ensuring the adequate provision of appropriate infrastructure.
- There are concerns about delays in having new infrastructure approved by the distributor.
- There is scope for investigating appropriate alternatives to ensuring the connection of new infrastructure to the network through appropriately certified personnel, whilst recognising the high costs of distance and transport relative to urban consumers. These alternatives would need to recognise the requirements of the distributor in searching for a lower cost alternative to the current arrangements.
- There was a widespread non-understanding of the cost structures of the services and equipment that distributors can provide to farm customers.
- The distinction between the authorisation levels of contractors can impose additional costs and there is scope for investigation of appropriately meeting safety standards at a lower cost to farm consumers by reassessing responsibilities for the electrical contractor levels.
- There is scope to investigate the use of technologically advanced electronic meters for remote reading. Though there would be additional costs in these meters there could be savings in labour time for the meter readers with those cost savings shared with the farm consumer.
- There could be greater communication and information made available on methods by which farmers can adopt technologies or practices that minimise problems for their equipment.
Chapter 3  Electricity usage in the dairy industry

This chapter provides an examination of the dairy industry, which of all the land extensive agricultural industries is the most dependent upon the consistent reliability of electricity provision and is also a much greater relative user of electricity as an input into production than the other land extensive or broadacre industries.

Electricity usage for agricultural production purposes is on a daily basis. Major requirements are for:

- the milking machinery, which is used a minimum of twice and sometimes three times per day
- the chillers for the raw milk before it is picked up
- refrigerators for animal health products, such as vaccines
- hot water systems for cleaning equipment in the dairy
- computers and other electronic data and sensory systems for quality control and recording purposes
- irrigation pumps for some farms and at various times
- farm workshop requirements

These requirements demonstrate the crucial nature of reliability of supply for dairy farmers. Losses from failures of power supply can be very significant. One farmer commented that:

"A few years ago we lost power for three days, and that cost us over $30,000. We lost milk production for those three days and subsequent losses as we had to bring the cows and farm back to normal operations and that took some time" and

"We did not have a backup generator but we do now that can handle most of the operations of the dairy"

3.1  Power outages

The extent of the impact of power outages on dairying is highly variable according to the time of day and the duration. If the outages are less than six hours and between milking times, the outages may not be very damaging to farm operations. Outages between 6 to 12 hours and again depending upon the time the impact of the damage potentially caused can be minimised. Over 12 hours and there can be significant problems for the operation of the dairy. As demonstrated in Table 3.1 most power outages were in the less than six hour category and next most common were in the 6 to 12 hour category. There was only one case of a power outage in the period of 12 to 24 hours and none above that.

One dairy farmer said that he had very few problems with blackouts as they were generally fixed within half an hour. He said that he was in an unusual position in that he was on the town supply line and some of his fellow farmers could wait up to 24 hours or more for their lines to be operational again.
### Table 3.1 Number of power outages

<table>
<thead>
<tr>
<th></th>
<th>less than 6 hours</th>
<th>between 6 to 12 hours</th>
<th>12 to 24 hours</th>
<th>24 to 72 hours</th>
<th>greater than 72 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>18.0</td>
<td>12</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
<td>3.6</td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Max</td>
<td>24.0</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Min</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 3.2 Incidence of power problems

Survey results were compiled from the Internet survey and from meetings with dairy farmers at formal organised sessions and also informal sessions arranged with dairy farmer groups where possible. In answer to the question on power failures and consistency of power (e.g. voltage surges, drops and brownouts) the results from all the sources are shown in Table 3.2.

### Table 3.2 Power failures dairy industry

<table>
<thead>
<tr>
<th></th>
<th>Respondents answering question</th>
<th>All respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of power surges</td>
<td>Number of Voltage drops/Brownouts</td>
</tr>
<tr>
<td>Count</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Mean</td>
<td>3.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Max</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Min</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Not all respondents answered all the questions that were presented to them. The information from those answers is presented under two different scenarios. Scenario one provides the statistical measures from those respondents that specifically answered the question. These are presented in the first two columns of the table. Scenario two primarily adjusts the mean affected by assuming that all those respondents to the survey questionnaire who did not answer the question did not have any power failures.

The difference between the two scenarios is primarily reflected in the mean or average impact on farmers where the average number of power surges for farmers declines by more than half over the total population compared to respondents who answered the specific question.

Similarly for those who reported voltage drops or brownouts, the average impact declines to only a third of that which was reported by those who answered the question.

When outages occur, dairy farmers at a meeting raised the issue of a priority list for rectification of these problems. The priority list could be for nominated times of the day rather than a 24-hour priority. When questioned as to whether they would be prepared to pay for this service, there was
agreement that they would consider paying for it but details would have to be worked out on the expected quicker rate of return of power and the consequent cost savings compared to the cost of this quicker return to service.

### 3.3 Notification of outages

Figure 3.1 presents the responses to the survey question on notification periods for outages. Most of the options had zero responses. The vast majority were in the 7 to 14 day period with a small minority in the 3 to 7 day period.

From the survey information, it is clear that the electricity distributors do try to and managed to provide adequate warning periods to dairy farmers on likely interruptions to supply. There were no questions in the survey as to the time period of the day when the outages were likely to occur but discussions at meetings indicated that the distributors tried to schedule the outages for non-peak period times of the day for dairy farmers.

![Figure 3.1 Notification periods of outages](image)

### 3.4 Power failure: costs and backup generation

The dairy industry is very reliant on electricity supply reliability for the operation of the milking machinery and cooling systems. They can be subject to very high costs from power failures. The costs for a dairy farmer encompass a wide range of factors as shown in Table 3.3.

Even with backup generation for the dairy, additional costs can be incurred on farm operations from the failure of the mains supply. These additional costs including the need to prime pumps, repair damage and rectify other problems from the failure of electric fences for livestock and in some cases the loss of water, primarily on a take or pay basis, for livestock from the inability to use pumps.

As shown in Table 3.3 losses from electricity power failures can range up to $70,000 for an individual farm.
### Table 3.3 Costs of power failure – dairying ($)

<table>
<thead>
<tr>
<th></th>
<th>Costs of operating backup electrical equipment</th>
<th>Loss of produce</th>
<th>Damage to equipment</th>
<th>Paid staff unable to work</th>
<th>Overtime labour costs to make up lost production</th>
<th>Costs to bring farm back to normal operation</th>
<th>Pumps needing to be primed to avoid damage</th>
<th>Problems with livestock from the failure of electric fences</th>
<th>Loss of water for livestock from pump failure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>8328</td>
<td>12750</td>
<td>10167</td>
<td>425</td>
<td>300</td>
<td>940</td>
<td>3100</td>
<td>2667</td>
<td>1000</td>
<td>13316</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>15000</td>
<td>20000</td>
<td>35000</td>
<td>1000</td>
<td>300</td>
<td>2000</td>
<td>5000</td>
<td>5000</td>
<td>1000</td>
<td>70000</td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>200</td>
<td>8000</td>
<td>1000</td>
<td>200</td>
<td>300</td>
<td>300</td>
<td>1500</td>
<td>1000</td>
<td>1000</td>
<td>800</td>
</tr>
<tr>
<td><strong>Count</strong></td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>24</td>
</tr>
</tbody>
</table>
Box 3.1 Case study – three-day power failure

A dairy farmer related the story of a power failure he had some years ago and the costs that he incurred from that power failure. It was an unusual one in that it lasted for three days and the direct costs per cow of lost production was $10 per day per cow for the three days and he was a significant size farmer milking 1000 cows per day. The direct losses of production were $30,000 from the immediate impact of a power failure and there were subsequent losses from the extended period after the power was returned in getting the cows back up to normal production. He did not provide an estimate of those additional costs.

Other costs incurred included the loss of veterinary chemicals in his milk shed refrigerator. No costings were provided of this loss.

He also made the point that he did not have any backup generation and consequently because of the impact of that power failure he purchased a 100 KVA generator. He said it has only been used rarely since that time but he regards it as an effective insurance policy in case of future power outages.

Dairy Australia has researched and made recommendations for what can be done for alternative milking arrangements during electricity blackouts. They noted the problem and recommended:

"Few farms at present have emergency generators to operate the milking machines, for cooling the vats and water pumps."

and

"Farmers should consider purchasing a generator for blackouts, especially in areas where power supply is unreliable. The size of generator required will vary depending on the size of the milking plant, cooling vat and water pump sizes Generators of 35KVA capacity should be sufficient for most average size farms."

From the respondents who indicated they had backup generation, all at least met the minimum recommended size of 35KVA and the mean generator size was significantly higher at 86 KVA.

However, after the experience of an extended power failure some farmers do change their operations to ensure they have the insurance policy of sufficient backup generation. It was noted in the responses that unlike in other industries, dairy farmers used only single generators rather than multiple for their backup generation capacity.

Table 3.4 On farm generation capacity - dairying

<table>
<thead>
<tr>
<th>Mean number of generators</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Generator size (KVA)</td>
<td>86</td>
</tr>
<tr>
<td>Max(KVA)</td>
<td>300</td>
</tr>
<tr>
<td>Min(KVA)</td>
<td>35</td>
</tr>
</tbody>
</table>
3.5 Complaints

Only 13 of the dairy farmer respondents answered the questions relating to complaints. Of these only six had made complaints to their distributor about power supply issues and four of them stated that the problem had been resolved effectively. There was one complaint that there had been a delayed response and one that there had been no response. On the assumption that those who did not bother answering the question had made no complaints and the majority of those who had made complaints had them dealt with effectively, the reasonable conclusion is that issues dairy farmers raise about power supply issues are appropriately dealt with by the distributors. A summary of the survey responses to this question are provided in Table 3.5.

Table 3.5 Complaints - dairy industry

<table>
<thead>
<tr>
<th>Answered question</th>
<th>Responses</th>
<th>Problem resolved</th>
<th>No response</th>
<th>Delayed response</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>no</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New infrastructure

There were only four dairy farmers who had installed or were installing new infrastructure of which only two farmers noted problems. Their comments were:

*we are currently trying to secure quotes to upgrade a transformer etc and it is proving to be difficult to get straight forward information from the supply company about this...and finding electricians licensed to do this is also not so easy.*

*Very slow in obtaining consent for a power reconnection*

3.6 Findings

- Dairy farmers raised the issue of a priority list for service difficulties. As dairy farmers are highly dependent upon the regularity of power supply especially at specific times of the day, it would be worthwhile for consideration to be given to including dairy farmers on a priority list where they have nominated the particular times of day at which it is essential that they have power supply. Any additional charges for this service would need to be negotiated between the parties.

- Notwithstanding the development of a priority list with consequent price signals, the effects of power outages on the industry are severe enough to warrant some degree of self insurance to minimise the impacts on the farms operations. As noted this is recommended by Dairy Australia.

- There were no other significant differences in policy issues and addressing problems between dairying and the other broadacre industries.
Chapter 4  Electricity Usage in the Australian Poultry Industry

This chapter examines the poultry industry, which is deserving of separate analysis due to the sector’s high electricity consumption and sensitivity to the reliability of electricity provision. In 2004 there were approximately 420m birds processed annually and Australia contributed less than 1 per cent of global poultry production.

The Poultry industry is by far the most electricity dependant agricultural industry. Electricity is a critical input in poultry production due to reliance on temperature control and sophisticated electronic monitoring equipment. The industry’s reliance on this equipment also means that it is the most vulnerable; heavy losses would result if adequate electricity provision was not available.

The industry is also exceptional in that their dependence on electricity, coupled with the devastating consequence of inadequate provision and unacceptable reliability in farming regions have prompted a high degree of self protection through personal generators.

Broad ranging statistics for this industry proved difficult to find, and reliance for this section was placed on survey results from online survey responses, written submissions and in person surveys undertaken at the NSW Farmer’s Association’s Poultry Farmer’s field day. Further follow-ups were undertaken with individual farmers from a separate inquiry into biosecurity issues. The number of responses received is insufficient to represent the industry as a whole, but adequate to indicate the problems with electricity provision, personal safeguards commonly put in place and the high costs incurred as a result of inadequate electricity provision. The data received has been manipulated for consistency (e.g. costs information was received in terms of annual costs, per hour costs and in some instances measured in terms of litres of diesel)

4.1 Incidence of Power Problems

The provision of electricity to the various farmers surveyed showed that there was a general inadequacy of energy both in terms of power failures and consistency of power (e.g. voltage surges, drops and brownouts) across all regions. The relevant survey data is reproduced in Table 5.1
Table 4.1 Problems Encountered in the preceding 2 years

<table>
<thead>
<tr>
<th>Frequency of Power Failures</th>
<th>Period of Power Failures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Min</strong></td>
<td><strong>&lt;6 Hours</strong></td>
</tr>
<tr>
<td></td>
<td>77.1 per cent</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td><strong>6 - 12 Hours</strong></td>
</tr>
<tr>
<td></td>
<td>20.5 per cent</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>12 - 24 Hours</strong></td>
</tr>
<tr>
<td></td>
<td>0.6 per cent</td>
</tr>
<tr>
<td><strong>Number of Power Surges</strong></td>
<td><strong>24 - 72 Hours</strong></td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>10*</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>4*</td>
</tr>
<tr>
<td><strong>Number of Voltage drops/Brownouts</strong></td>
<td><strong>&gt; 72 Hours</strong></td>
</tr>
<tr>
<td><strong>Min</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>365</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>48</td>
</tr>
</tbody>
</table>

* - Outlier results were omitted for the calculation of these figures. There were reports of daily power surges which resulted in the activation of touchlights. However, while the activation of these lights does suggest a power surge, the sensitivity of these lights suggests these surges may have been extremely minor.

There is a high degree of variability in frequency of power failure between regions and in some circumstances between farms in the same region. While some farms suffer from more frequent power problems than others, the overall standard of electricity provision can only be deemed inadequate to be relied on for poultry farming.

Reports from the farmers interviewed indicate that due to the availability of automatic monitoring systems and automated backups it is quite possible that the number of power failures encountered is actually greater than was reported.

One egg farmer told of an occasion when an overhead storm prompted her to check whether the power had gone off. At this stage power was still being provided, she returned to collecting eggs. While she was collecting the eggs the power died and the backup generator engaged without her knowledge. Some hours later she went back to check the power and only became aware of a power failure because the backup generator had consumed all its fuel. If it
was not for this second check she would have been unaware of the power failure, and if a second failure occurred while the generator had no fuel, she may have suffered massive losses.

Another egg farmer indicated that because of automated systems, power failures are of less concern than provision of poor power. Dirty electricity provided to this farmer has been measured at a power factor of 0.7. Brownouts damage electrical equipment and impose a direct cost on farmers through the repair of power meters and other damaged equipment. This farmer indicated that she had encountered voltage drops “too many times to count”.

### 4.2 Power Failure: Costs and Backup Generation

As has been noted, the reliance of the poultry industry on electricity for temperature control and monitoring means huge potential costs in the event of power failure. Chickens are extremely sensitive to temperature and extended periods of lost temperature control will often result in large scale livestock deaths.\(^1\) The results of the survey data relating to likely costs incurred from a power failure (without backup generator protection) is summarised below in Table 4.2. In addition one respondent in the egg industry noted that there would be an additional loss of produce only slightly less than the value of the loss of livestock from a power failure. It was also claimed that with the loss of livestock in the egg industry it would take up to 15 months to get back to normal production with the replacement birds.

Table 4.2  Expected costs from Power Failure (Without Backup) ($)

<table>
<thead>
<tr>
<th></th>
<th>Costs of operating backup electrical equipment</th>
<th>Loss of livestock</th>
<th>Damage to equipment</th>
<th>Paid staff unable to work</th>
<th>Costs to bring farm back to normal operation</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>294</td>
<td>181667</td>
<td>1000</td>
<td>2000</td>
<td>10000</td>
<td>7225</td>
</tr>
<tr>
<td>Min</td>
<td>80</td>
<td>45000</td>
<td>3000</td>
<td>1000</td>
<td>10000</td>
<td>1400</td>
</tr>
<tr>
<td>Max</td>
<td>1500</td>
<td>920000</td>
<td>3000</td>
<td>5000</td>
<td>20000</td>
<td>20000</td>
</tr>
</tbody>
</table>

As has been noted, Table 4.2 indicates the expected losses which would be incurred without backup generator protection. However, due to the magnitude of these costs and the unreliability of electricity provision in these regions, all farmers surveyed indicated that they had personal electricity generation equipment.

Not all specified the size of their capacity and some results had to be interpolated from figures provided for diesel usage per hour (For example, a 20 L per hour usage of diesel was assessed to run a 100 kVA generator). These figures are provided below in Table 4.3.

---
\(^1\) In the case of broiler growers, heating is required for the young chicks and at the most vulnerable stage these chicks cannot survive without power for heating for more than 15 minutes. Operations are computer controlled and therefore highly power dependent. Reliability factors are extremely important for both large and small producers.
While all poultry farmers utilised significant backup systems, there was not a common trend as to protection. Some farmers relied upon multiple generators while others would rely on a single large-scale generator. Those that use multiple generators sometimes had them in configurations of a single size while others had a mixture of large and small generators.

Overall the backup provided by these generators ranged from the minimum provision necessary to prevent livestock death up to a complete backup system capable of providing full scale operation so that farming would be unaffected by power failure (except through the additional operating costs). Generally the backup provision was sufficient to allow the bulk of, if not all, operations to continue in the event of power failure.

### 4.3 Quality of Service and Communication: Notified Outages and Complaints

**Notified Outages**

Feedback was also given by farmers about the frequency of notified outages and the period of notice given before the power outage took place. The feedback received outlined the number of times each farmer experienced an outage with prior notice and the period of notice received. However, feedback only pointed to the typical period of notice rather than the number of instances that a given period of notice was given to that farmer.

For this reason two versions of per cent frequency have been provided in Table 4.4 (see Footnote).^2

---

^2 Ver. 1. Gives the unweighted probability of each notice period with no regard to the number of outages experienced by the farmer

\[ \text{i.e. number of farmers who indicated period } X \text{ divided by total farmers} \]

Ver. 2. Gives the weighted probability according to the number of outages experienced by each farmer

\[ \text{i.e. (Period indicated by farmer times the number of outages experienced by farmer) divided by total notified outages} \]
Table 4.4 Annual Notified Power Outages and Notice Periods

<table>
<thead>
<tr>
<th>Number of Notified Outages (annually)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Max</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.25</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Period of Notification prior to outage</th>
<th>Ver 1.</th>
<th>Ver 2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Day</td>
<td>8.3 per cent</td>
<td>15.4 per cent</td>
</tr>
<tr>
<td>2 Days</td>
<td>8.3 per cent</td>
<td>2.6 per cent</td>
</tr>
<tr>
<td>3 - 7 Days</td>
<td>41.7 per cent</td>
<td>56.4 per cent</td>
</tr>
<tr>
<td>8 - 14 Days</td>
<td>41.7 per cent</td>
<td>25.6 per cent</td>
</tr>
<tr>
<td>&gt;14 Days</td>
<td>0.0 per cent</td>
<td>0.0 per cent</td>
</tr>
</tbody>
</table>

The number of notified outages forms a small proportion of total outages (as indicated in Table 4.1). Using the mean values from these calculations, notified outages account for just 17.26 per cent of total power outages encountered and this figure does not take into account voltage surges and brownouts.

Additionally, the most common period of notice before a power outage (under either calculation method) is the 3-7 day band with the 8-14 days being the next most common, if not equally as common.

**Complaints**

25 per cent of the farmers surveyed had made complaints about service. Of these, 66.7 per cent were satisfied with the manner and time of the response received, the remainder were dissatisfied because of delayed response. There were no instances of no response being received, or an inappropriate response received. One farmer was unsure about who to contact in order to make a complaint.

Again, the sample size for this survey is insufficient to draw conclusions about the quality of complaint handling, but of those responses received, it appears that the complaint resolution services in place are adequate.

It was noted by one farmer that whenever callouts were requested regarding power failure, preference for early service was always given to a nearby mushroom farm.

Another farmer indicated that voltage drop was experienced both at his establishment and at the distributor. A meter was placed on the line to test for voltage fluctuations, but no information was ever conveyed to the farmer.
New Infrastructure

A number of farmers either installed, or were required to install, new infrastructure in the form of new power poles or transformers, or required maintenance of such equipment. Over the past two years 25 per cent of respondent farmers indicated they had performed, or were required to perform such services. Within this group 50 per cent encountered problems with ascertaining whose responsibility the maintenance was, 25 per cent had problems regarding quotes received and 25 per cent had problems involving the location of poles in paddocks.

One respondent indicated that he had encountered all 3 of these problems within the previous 2 years.

Comments

A poultry farmer, located in Mangrove Mountain, was required to pay $60,000 for the upgrade of his electrical supply, but the work was not undertaken until 12 months after he had made the payment.

There have been a range of issues surrounding the availability of particular types of meters (in particular time of use meters) and costs associated with back to base metering. The costs in this case were of the order of $1,100 – 1,200

For the provision of infrastructure to chicken growers, some claimed that things were negotiable indicating that the rack rates were not fixed

There were claims that a major chicken processor received subsidised infrastructure in another state for them to develop a chicken growing and chicken processing industry in that state to service the Eastern Australian market.

4.4 South Australian Developments

South Australia has indicated that it intends to become a major stakeholder in the Australian poultry industry. By 2015 SA intends to provide more than 50 per cent of domestic consumption. This would involve boosting gross food revenue from the $324m recorded in 2004 to $956m by 2015. If these targets are met, SA will grow from 9 per cent to 20 per cent of total Australian poultry production.

The expansion is estimated to create 1,200 direct jobs while retaining the majority of existing farmers within the industry. The SA expansion is estimated to result in up to 12 new breeder farms, 2 new hatcheries, and 20 new (500,000 bird capacity) processing facilities.

While the need to address the energy and associated infrastructure requirements has been noted and given high priority, there are scarce details of how this will be addressed.

In 2005 energy used for growing and processing in SA was 17920 MWh. By 2015 it is predicted to rise to 37880 MWh.

4.5 Findings

- It is essential that poultry farmers have their own electricity backup as the scale of potential losses from power failures is extremely high.
- There is scope for improved technology to reduce nuisance aspects of power supply to their operations such as momentary outages.
There is a need to investigate means of ensuring imported equipment is not damaged by electricity supply problems and what the level of responsibility is for the distributor in meeting appropriate standards.

As raised earlier in the general agricultural chapter, there is scope for investigation in investigating better methodologies and approaches for metering of supplies to farmers.

There appears to be contradictory information and views amongst farmers as to what is contestable supply and what is monopoly provision as evidenced in the view of are rack rates negotiable.

---

**Box 4.1  Australian electricity supply standards and international equipment standards**

This case study demonstrates a problem not just for agriculture but also all users or potential users of imported equipment.

A series of low voltage problems developed for a poultry farmer. The farmer experienced a series of failures in climate control equipment, heating equipment and roller doors coupled with problems with his backup generator ‘cutting in and out’.

A distributor technician recorded a voltage of 259V. The technician advised the farmer that this level was higher than normal and could damage electrical appliances.

The farmer lodged a claim for expenses from Energy Australia as a result of the over-voltage incidents. The claim was for over $30,000 for damage to electrical equipment requiring repair or replacement, and for the additional operating costs incurred as a result.

This claim was denied on the basis that the recorded voltage surges did not exceed their requirements under the distributor's Electricity Network Operating Standards (ENOS).

The voltages supplied by the distributor were within the ENOS requirements, but were outside of the voltage range that the overseas appliances were designed to tolerate.

An independent technical expert noted that “there is a fundamental problem that much of the equipment imported into Australia is not suited to the voltage conditions that may be experienced.”

However, where acceptable electricity provision exceeds the common boundaries tested by international producers, it is hard to say the current regulatory boundaries are satisfactory.

More details on this issue are provided in Appendix 1.
Chapter 5  Electricity usage by farmers in the Western Division of NSW

The Western Division of NSW is different to most other pastoral regions in Australia in that it is connected to the grid. Most farmers in other states in the pastoral regions do not have grid connection unless they are within reasonably close proximity to a town.

Farmers in the Western Division, like most pastoral zone farms, are usually on very large holdings except in certain irrigation districts such as along the Murray River. The Western Division accounts for 40 per cent of NSW in area but it has only approximately 1000 farmers of which about 600 are in the pastoral zone. The other farmers are generally in the more intensive irrigation blocks.

The size of holdings and general remoteness of farms in the pastoral zone entails that the network is very extensive in distance with few customers on each line. Most of the Western Division has only had access to mains electricity since the early 1990s. Prior to the introduction of the grid, most farms were running their own generators and using alternative energy sources for various appliances such as kerosene fridges.

Regularly comments were raised about how good it was to be on the grid rather than having to be self reliant even if there were problems with the electricity supply from time to time.

One comment that was repeated many a time in similar language at meetings and interviews was:

*Grateful to have the power on*

Though there were over 30 respondents to the questionnaire provided on the NSW Farmers website and at various meetings, very few filled in all the questions or in detail. Most of the information in this chapter came from interviews with Western Division farmers either singly or in groups.
Box 5.1 Getting power to the Western Division - interview with Pat Lelievre, formerly on Cobar Shire Council

The landholders had to put up $23,000 each and the local council put up $3000 per landholder. The distributors then made a contribution on top which was generally of the order of $30,000 per landholder.

It was a case of one in all in. We got the farmers in.

We started in dry times, a very bad set of drought years, and everyone agreed in those times and when it came to actually putting it in and paying we had some good wet years that allowed us to cover the costs very quickly.

The driving forces for connecting to the grid primarily related to living conditions in the Western Division rather than agricultural production requirements, though these benefited as well such as getting power to watering points for the stock.

We needed the regularity of power supply for the education of the children who depended primarily on School of the Air and that meant they had to have faxes at that time which required the generator to be running all through the school time.

Another issue was safety for houses, as many residences relied upon kerosene fridges which unfortunately had a high incidence of causing house fires with the consequent financial and other costs for many families.

Food security for farmers in remote locations was also a priority as perishable goods could not generally be stored for extended periods without mains power. As farmers noted they generally obtained their perishables on the mail run and because many of the dirt roads would become impassable after 10 mil of rain, they could be isolated without fresh food for extended periods of time.

Many of the farmers in the Western Division have their own airstrips. The provision of mains power allowed the airstrips to be lit for night time use by the Royal Flying Doctor Service for emergency retrievals and thus improved the medical emergency and health factors for residents on farms in the Western Division.
5.1 Comments

Notified outages
For notified outages again very few empirical estimates were provided but there was a general acceptance that things were done appropriately and allowing for the conditions as much notice as possible was given. As an example of the general help and notification provided, the following comment was made at a meeting.

*For planned outages we get pretty good notice. Even if they are at short notice they will drive around and tell us.*

Power failures
Very few respondents provided specific empirical estimates of their power failures through blackouts, brownouts and voltage surges in the survey. In the open ended response area they did make a series of comments:

*Too many to count*

*Regularly*

*Barely a day goes by without something wrong*

*Hundreds*

The few empirical estimates were usually measured in the multiples of tens.

At meetings with Western Division farmers, the explanation provided by many participants was the Single Wire Earth Return system, which most of them were on, was highly unreliable especially in dry times. It was stated that the system led to very frequent brownouts and many very short-term losses of power.

At the meetings many farmers did state that they had blackouts that would go for hours or a day or two but many said they could not estimate them. However, they appear to be a much lower frequency than the short-term interruptions caused by brownouts or voltage drops.

Power quality
At the meetings the major impact of the power quality problems was the damage to equipment. The equipment most commented on was pumps for agricultural production purposes and household and workshop equipment.

Examples were provided of how some farmers have adapted to these conditions of power quality unreliability. Measures undertaken to deal with the problem included replacing old pumps with self priming pumps, and installing voltage relays which were said to minimise the damage from brownouts or voltage drops. Another method was using power intensive equipment (such as welders or relatively large pumps for the system) in the middle of the day when the farmer said there was generally less usage by other consumers on the line. As noted in this paper, much of the usage of electricity in the Western Division was said to be for domestic household usage, where peaks reflect consumption patterns for other domestic consumers in urban areas.

Another farmer stated that:
Power only used for domestic

This is not to say that all customers were unhappy with the power system. As noted earlier many were happy to have grid power and as one farmer stated:
You learn to live with it

Comments from farmers on the power quality issues reflected specific practical issues generally.
Regarding brownouts and surges... Power seems to be either off or on
The lines are all single Earth returns with brownouts/low voltages and significant dropouts
The long lines mean the fuse loads are too low and lightning trips them
The power kicks out but comes on well
There is stress on the lines from newer users
They need to do more maintenance for the insulators
They need to get better at vegetation management for bushfire control. Fires in the Western Division are in the good years not drought years like other areas
Lines used to be fixed by midnight now it's midday the next. This is primarily due to OHS rules as the crews had worked to long and it was too dangerous

However, there were also positive comments such as:
The work done by the crews was incredible as they were out in all kinds of difficult conditions and never complained
Fault repairs are done as expeditiously as conditions permit - boggy roads, difficult terrain etc.

Complaints
Very few respondents indicated that they had made formal complaints to distributors in the survey forms.
At the meetings there are examples provided where many farmers take up their problems or complaints on an informal basis with distribution staff when they contact them or meet them in an official or unofficial capacity. Farmers were generally full of high praise for the staff of the distributor that they dealt with.

5.2 On-farm generation

All respondents and comments at the meetings and interviews, indicated every farmer had backup generation – usually more than one generator per farm. Empirical estimates are provided in Table 5.1 and the conclusions can be drawn that farmers in the Western Division provided their own insurance policy for many of their requirements and relative to other electricity intensive agricultural industries such as poultry and dairying; they have significantly smaller requirements in generation capacity.
Table 5.1  On farm generation capacity - Western Division

<table>
<thead>
<tr>
<th>Sum</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>16</td>
</tr>
<tr>
<td>Average Number of generators</td>
<td>1.9</td>
</tr>
<tr>
<td>Average size of generators (kVa)</td>
<td>8.1</td>
</tr>
<tr>
<td>Average generation capacity per farm (kVa)</td>
<td>16.2</td>
</tr>
<tr>
<td>Min capacity per farm (kVa)</td>
<td>4.7</td>
</tr>
<tr>
<td>Max capacity per farm (kVa)</td>
<td>27</td>
</tr>
</tbody>
</table>

5.3 Infrastructure

New infrastructure

There were very few respondents to this question. However at meetings farmers did discuss the issue and the views were that because of the geographic distances for suppliers to travel, they would always be a high cost region and suppliers would give quotes but taking into account the higher cost there was rarely much difference in prices.

One farmer said that one of the contributing factors for his building a new house on a particular location was that it was cheaper to knock down the house rather than putting in additional poles and infrastructure. He did state it was not the only factor but was a contributory factor.

Another issue in terms of costs of new infrastructure indirectly was stated by one farmer as:  
*I am pulling out poles and putting in diesel pumps because of the power availability charge*

Existing infrastructure

Even though most of the infrastructure in the Western Division is relatively new, there are some parts that have been on the grid because they are in reasonable proximity to major towns or some other grid sources. One issue raised was in regards to old poles left in the paddock where an arsenic containing chemical had been used as a preservative on the timber and the farmer stating that these poles potentially cause residue problems for their livestock.

5.4 Costs

Respondents in many cases stated that they faced significant losses from power losses but very few quantified the extent of the losses they incurred. In comments and meetings many stated that the costs related more to inconvenience and use of the farmer’s time in rectifying and checking problems.

Some of the comments made were:

*Minimal losses but it is more inconvenience*
Priming pumps after a blackout

The loss of foodstuffs when there is a blackout or other power problems happens where the equipment has to be reset

Power reliability when using centre pivot irrigation is a real concern and cost

Power problems when pumping stock water means I have to drive miles to fix the pumps

We are on single earth returns and we get brownouts that burn motors out or trip the resets

I am constantly getting equipment damage because of power reliability

Who owns the poles and who should maintain them

5.5 Findings

- Farmers in the pastoral zone of the Western Division are generally happy to have access to grid power primarily for quality of life issues.
- The single wire earth return system does create some problems for the operation of their farm equipment in particular and many have found ways of adapting to the system in place.
- There are some unusual facets that deserve further investigations such as the standing costs and new infrastructure costs that deter further usage of the existing electricity infrastructure in place.
Appendix 1

Case Study: Australian electricity supply standards and international equipment standards

Background

A NSW Poultry farmer had four climate controlled sheds which enabled a production capacity of 130,000 chickens. The farmer and his neighbour had (from 1987 – 2005) experienced ongoing voltage issues. The root of these problems could be traced to an upgrade to the transformer from 50 kVA to 200 kVA in 1998. This resulted in problems for the neighbour’s equipment. Energy Australia responded by tapping down the transformer. Following this adjustment, low voltage problems developed for the poultry farmer (most likely resulting from population growth in the area). In 2002 Energy Australia responded to this problem by ‘tapping up’ the farmer’s transformer.

In April 2005 Energy Australia installed a new voltage regulator to boost the feeder current and alleviate voltage drops at high demand times. Energy Australia did not tap down the farmer’s transformer before installing this equipment.

The farmer attributes the damage suffered in 2007 to this failure to re-adjust his transformer output after installing the new regulator.

Substance of the Claim

In May and June 2007 this farmer experienced a series of failures in climate control equipment, heating equipment and roller doors coupled with problems with his backup generator ‘cutting in and out’. On 5 June Energy Australia dispatched a technician who checked the meter board and recorded a voltage of 259V. The technician advised the farmer that this level was higher than normal and could damage electrical appliances.

The farmer sent a letter to Energy Australia about the energy fluctuations and the risk they posed to his farming operation.

Appliance problems continued through June until Energy Australia ‘tapped down’ the power at the transformer to reduce the voltage flow to the farmer’s property on 27 June.

The farmer lodged a claim for expenses from Energy Australia as a result of the over-voltage incidents in May and June. The claim was for over $30,000 for damage to electrical equipment requiring repair or replacement, and for the additional operating costs incurred as a result.

This claim was denied on the basis that the recorded voltage surges did not exceed their requirements under Energy Australia’s Electricity Network Operating Standards (ENOS) which required 240V +/- 10 per cent.

The farmer further complained of inconsistencies between the ENOS and Australian standards, international recommendations and the tolerable voltage range supported by some appliances.

Table A1.1 outlines the acceptable voltage ranges outlined in both binding and best practice guidelines.
### Table A1.1

<table>
<thead>
<tr>
<th>Provision Standard</th>
<th>Stated Range (As Stated)</th>
<th>Stated Range (Raw range)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENOS Target</strong></td>
<td>240V +/- 6 per cent for 95 per cent of customers 95 per cent of the time</td>
<td>226-254V 95 per cent of the time</td>
</tr>
<tr>
<td></td>
<td>240V +/- 10 per cent 100 per cent of the time</td>
<td>216 - 264V 100 per cent of the time</td>
</tr>
<tr>
<td></td>
<td>(With utilisation voltage drop*: 204 - 264V)</td>
<td></td>
</tr>
<tr>
<td><strong>AS/NZS 60038-2000</strong> (Current Australian Standard)</td>
<td>Steady State range: 216.2-253V (230V +10 per cent or -6 per cent)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Short Duration range: 207-262V</td>
<td></td>
</tr>
<tr>
<td><strong>Previous Australian Standard</strong></td>
<td>240 +/- 6 per cent</td>
<td>225.6 - 254.4V</td>
</tr>
<tr>
<td><strong>International Standard</strong> (Appliance Manufacturers)</td>
<td>230V +/- 10 per cent</td>
<td>207 - 253V</td>
</tr>
<tr>
<td><strong>AS/NZS 60335.2.71:2002</strong></td>
<td>11.4 - Heating appliances should cope with 1.15 times the rated voltage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.5 - Motor-operated appliances should cope with between 0.94 and 1.06 times the rated voltage</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11.6 - Combined appliances should cope with between 0.94 and 1.06 times the rated voltage</td>
<td></td>
</tr>
</tbody>
</table>

(* Note: Utilisation Voltage takes the voltage at the consumer’s connection point and compensates for potential voltage drop resulting from the consumer’s installation)

The follow up investigation by EWON’s independent Engineer, Professor Baitch, found that the recorded voltages at the farmer’s property did not exceed the maximum allowable voltages prescribed under the ENOS target.

Professor Baitch noted that standard checks that Energy Australia should carry out prior to installation of the regulator include a study to establish the optimal tap setting for each transformer. Energy Australia responded that such studies were undertaken and it was not deemed necessary to alter the transformer tap at that time.
The farmer’s claim was denied on the basis that the voltage supplied was not outside of the range required by ENOS. Energy Australia has no legal obligation to comply with AS 60038-2000; AS/NZS 60335.2.71:2002 is a guide targeting consumers and other State regulations (such as the Victorian guidelines) are not applicable.

**The Larger Problem**

While Energy Australia may have met their formal requirements regarding energy provision to the farmer, this case study illustrates the larger problem that acceptable voltage ranges are wider than many appliances can tolerate.

The voltages supplied by Energy Australia were within the ENOS requirements, but were outside of the voltage range that the overseas appliances were designed to tolerate. Most international appliances are designed to operate within the range of 230V +/- 10 per cent which allows operation in 230V and 240V areas with a +/- 6 per cent allowance around these target voltages. Energy Australia’s target voltage range (ENOS) exceeds the maximum voltage range for these appliances and matches the lower boundary. As a consequence of this, Professor Baitch noted that “there is a fundamental problem that much of the equipment imported into Australia is not suited to the voltage conditions that may be experienced.” (EWON Investigations report, page 10)

The problem of Australia’s ‘relaxed’ electricity provision requirements is reflected in guidelines such as AS/NZS 60335.2.71:2002 which suggests that appliances for the rearing and breeding of animals should be tested outside their target operating ranges before being relied upon due to the wide range of acceptable voltage fluctuations in Australia.

These guidelines are not binding, and it would be inappropriate for government to ensure that consumers purchase appropriate appliances. However, where acceptable electricity provision exceeds the common boundaries tested by international producers, it is hard to say the current regulatory boundaries are satisfactory.
References

ABARES, AGSURF Database
AEMO, Richard Hickling, Value of Customer Reliability Background Paper
Australian Energy Regulator, ACT and NSW Electricity Distribution Network Service Providers Performance Report for 2009–10
BREE, Energy in Australia 2012, Canberra,
CRA, Assessment of the Value of Customer Reliability (VCR), 2002
CRA, Assessment of the Value of Customer Reliability (VCR), 2008
Crooks, S, Australian vegetable growing farms: an economic survey, 2008–09, ABARE–BRS.
Dairy Australia, Technical Note: Alternative Milking Arrangements during Extended Electricity Blackouts
IPART, Review of regulated retail tariffs and charges for electricity 2010-2013
NSW DPI, Bacon production, 2005
NSW DPI, How much does it cost to pump?
PIRSA, Poultry meat in South Australia — strategic directions 2005–2015
QDPI, Michael Admans, Poultry - Intensive Broiler Production, 2008
Acknowledgements

I would like to thank all those who participated in meetings and provided information through the questionnaires and directly.

I would like to thank the staff and office bearers of NSW Farmers Association for their assistance in the project.

Robert Janissen and Brett Janissen made valuable contributions to this report and the consultations.

All errors and omissions are my responsibility.