

# The Negative Effects of Electricity Cost Increases on Sugar Cane Production in the Bundaberg Mill area.

## CASE STUDY



Rapidly increasing costs of irrigation, mainly energy used on-farm and by the SunWater channel system, will lower farm marginal returns and lead to a reduction in water use by Bundaberg sugarcane growers. This potential loss of production is of serious concern as a 5 to 10% loss of production will increase the possibility of further sugar mill closure/s in the Bundaberg region and loss of jobs throughout the growing, harvesting, transport, milling and associated service sectors of the industry.

Bundaberg has arguably one of the most variable climate on the planet (Professor Rodger Stone, USQ) with rainfall varying from well below to well above the annual crop requirement year on year. In these circumstances, continued rapid rises in energy costs to essential inputs (irrigation) in agricultural industries will jeopardise the future viability of decades of community and private infrastructure development.

Tariff 62 is a common irrigation energy plan for the 60% of sugarcane irrigation users at Bundaberg with big gun travelling irrigators. Based on night off-peak use (65%) and day use (35%) the energy component in on farm irrigation costs has risen by 62% from 2008 to 2012 (4 years).

If the 2013 draft tariff increase is implemented this will amount to an overall 90% increase in irrigation pumping cost for tariff 62 over 5 years. Assuming that during the first two years of the proposed 7 year transition for the phase out of tariff 62 there is an annual increase similar to that proposed for 2013 the overall increase will be 163% over 7 years.

Energy used for pumping is also a major part of SunWater operational costs and water charges will be similarly impacted.

From 2006-07 to 2011-12 the average annual energy component of SunWater's total operating cost for the Bundaberg Irrigation Distribution System was 28.49% (QCA SunWater Irrigation price Review 2012-17). It is true that there were water availability and seasonal issues that impacted on the quantity of water used over this period, however, the same report indicates and expectation that from 2012-13 to 2016-17 the average energy cost will increase to 39.71% of the total annual operating cost.

Cost increases of this magnitude will have a significant impact of future sugar industry gross margins and threaten the longer term future of agriculture in the Bundaberg region.

Historically, enterprises reduce and even cease commercial sugarcane operations when commodity prices and/or input costs impact adversely on economic viability. This is an outcome that the Bundaberg sugar industry cannot afford.

## Value of Irrigation

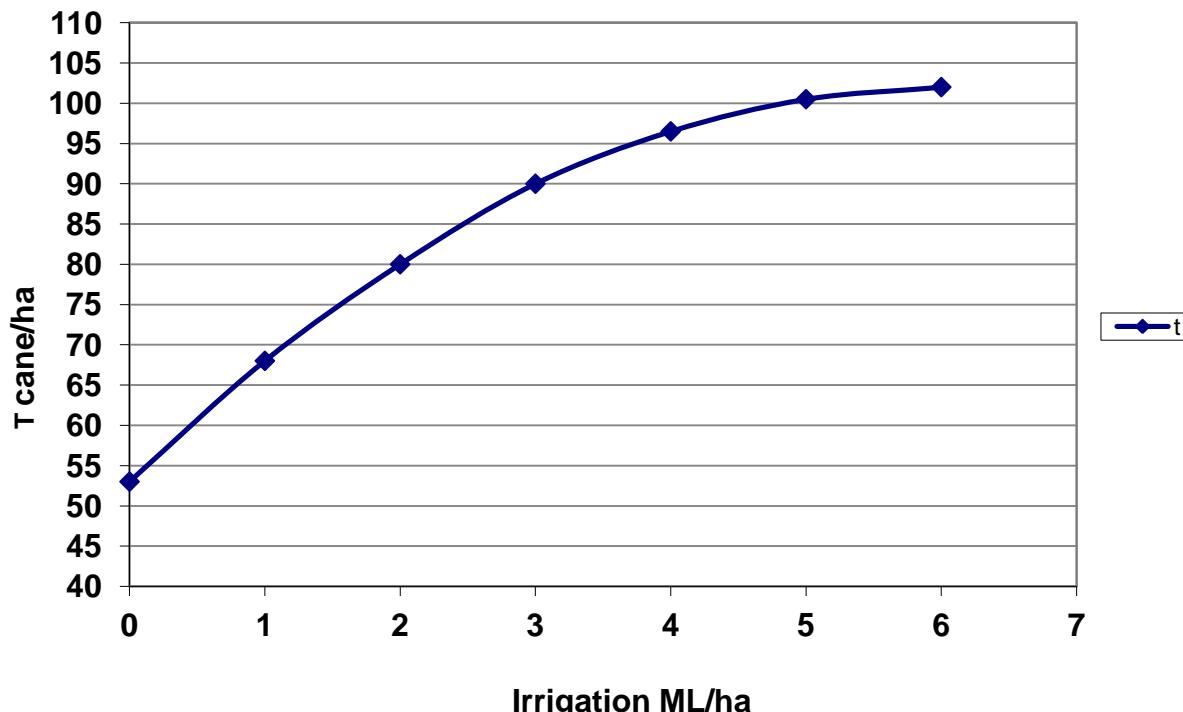
The value of irrigation to the Bundaberg region was realised in the 1960's when industry lobbied State and Federal Governments for an irrigation scheme to drought proof the region. The Bundaberg surface water irrigation scheme commenced in the 1970's and the immediate effect was a progressive increase in the area of land under production. This has supported the economy of the region for many decades.

*Figure 1* shows that on average Bundaberg sugarcane crops produce an uneconomic 53 tonnes cane per hectare (TCHA) if no irrigation is applied. This increases by about 15 tonnes TCHA for the first megalitre per hectare (ML/Ha) of irrigation applied, 12 TCHA for the next ML/Ha and 10 TCHA for the third ML/Ha. Average sugarcane yield at Bundaberg since the inception of full irrigation is between 80 to 90 TCHA which equates to an average irrigation water use of about 3ML/Ha.

*Figure 1* also clearly shows that on average the application of one ML/Ha of extra water (3 - 4 ML/Ha) produces an extra 6 TCHA while moving from 4 to 5 ML/Ha only generates an extra 4 TCHA of cane. The use of one extra ML/Ha (3-4 ML/Ha) raises productivity and profitability but escalating input costs are likely to limit water use at the higher end of the production curve thus restricting and/or lowering industry profitability.

The production curve shown in *Figure 1* is based on indicative information formulated from more than 10 years of actual district irrigation water use and yield data.

***Figure 1: Impact of Irrigation on Sugar Cane Yield in the Bundaberg Mill Area***



## Energy Use per ML of Irrigation Applied

The impact of increased electricity cost is felt most severely by irrigators operating big gun travelling irrigators. Approximately 60% of the most productive sugarcane enterprises in Bundaberg operate these systems. Low pressure systems do offer a lower operating cost alternative but the size and layout of many landholdings in conjunction with district topography and conversion cost inhibits the uptake of this equipment. The average cost of energy to pump a megalitre (ML) of water is shown in Tables No 1 and 2 below. Data collected during government funded water use efficiency projects and recent irrigation pump performance audits are compared to past, current and potential future electricity tariffs.

**Table 1: Travelling irrigator electricity cost per megalitre (ML) based on tariff 62 - 65% night off-peak and 35% day use**

Pump	Motor capacity	Energy Use	2008-09	2012-13	Draft 2013-14	Assumed 2014-15	Assumed 2015-16
	kW	kWh/ML	@12.83 c/kWh	@20.77 c/kWh	@24.41 c/kWh	@28.67 c/kWh	@33.69 c/kWh
<b>1</b>	37	273	\$35.01	\$56.71	\$66.64	\$78.29	\$92.00
<b>2</b>	37	333	\$42.71	\$69.18	\$81.28	\$95.50	\$112.22
<b>3</b>	45	360	\$46.17	\$74.79	\$87.87	\$103.24	\$121.32
<b>4</b>	45	390	\$50.02	\$81.02	\$95.20	\$111.84	\$131.43
<b>5</b>	45	255	\$32.70	\$52.97	\$62.24	\$73.13	\$85.93
<b>6</b>	35	369	\$47.32	\$76.66	\$90.07	\$105.82	\$124.35
<b>7</b>	30	197	\$25.27	\$40.92	\$48.09	\$56.50	\$66.39
<b>8</b>	22	224	\$28.73	\$46.53	\$54.68	\$64.24	\$75.49
<b>9</b>	32	346	\$44.37	\$71.88	\$84.46	\$99.23	\$116.60
<b>10</b>	45	402	\$51.56	\$83.51	\$98.12	\$115.29	\$135.47
<b>Average</b>	<b>37</b>	<b>315</b>	<b>\$40.39</b>	<b>\$65.42</b>	<b>\$76.86</b>	<b>\$90.31</b>	<b>\$106.12</b>

**Table 2: Low pressure centre pivot irrigator electricity cost per megalitre (ML) based on tariff 62 - 65% night off-peak and 35% day use**

Pump	Motor capacity	Energy Use	2008-09	2012-13	Draft 2013-14	Assumed 2014-15	Assumed 2015-16
	kW	kWh/ML	@12.83 c/kWh	@20.77 c/kWh	@24.41 c/kWh	@28.67 c/kWh	@33.69 c/kWh
<b>1</b>	18	102.51	\$13.15	\$21.29	\$25.02	\$29.39	\$34.54
<b>2</b>	22	233.69	\$29.98	\$48.54	\$57.04	\$67.00	\$78.73
<b>3</b>	22	204.83	\$26.28	\$42.54	\$50.00	\$58.72	\$69.01
<b>4</b>	30	196.67	\$25.23	\$40.85	\$48.01	\$56.39	\$66.26
<b>5</b>	55	221	\$28.35	\$45.90	\$53.95	\$63.36	\$74.45
<b>Average</b>	<b>29.4</b>	<b>191.74</b>	<b>\$24.60</b>	<b>\$39.82</b>	<b>\$46.80</b>	<b>\$54.97</b>	<b>\$64.60</b>

## A More Detailed Explanation

A more detailed explanation of the calculations used to generate Tables 1 and 2 follows. This review of electricity price impact is based on the indicative information formulated from more than 10 years of Bundaberg district actual irrigation water use and yield data, Queensland Government Rural Water Use Efficiency project data and recent irrigation pump performance audits.

Energy cost applied is based on: ERGON Tariff 62 - actual rate - 2008/09; ERGON Tariff 62 - actual rate - 2012/13; ERGON Tariff 62 - proposed transition period draft rate - 2013/14; and ERGON Tariff 62 - proposed transition period potential rate increase - 2014/15 and 2015/16.

On farm energy cost is an average cost per kWh based on a travelling gun scenario operating 65% of time between 9 pm and 7 am (night time off-peak) and 35% of time between 7 am and 9 pm (day time peak)

- 2008-09 – average use @ 12.83c/kWh: plus service charges of \$ 130.56 per metering point per annum (Tariff 62)
- 2012-2013 – average use @ 20.77c/kWh: plus service charges of \$ 200.50 per metering point per annum. (Tariff 62 obsolescent)
- 2013-2014 – average use proposed rate @ 24.41c/kWh: plus service charges of \$ 235.57 per metering point per annum
- 2014-2015 - assumed average use increase (2013-14 + 17.5%) @ 28.67c/kWh: plus service charges of \$ 276.79 per metering point per annum
- 2015-2016 - assumed average use increase (2014-15 + 17.5%) @ 33.69/kWh: plus service charges of \$ 325.23 per metering point per annum

Gross margin analysis utilises a constant cane price based on estimated 2012 season harvest pool value of \$450 at 14.5 CCS. Water use charge is based on actual and recommended charges and energy component of SunWater operational cost as outlined in the *Final Report, SunWater, Irrigation Price Review: 2012-17, Volume 2, Bundaberg Distribution System, April 2012 (QCA)*

## SunWater price impact

Electricity cost not only directly impacts on the viability on farm irrigation pumping systems but also the cost of the farm irrigation water supply.

The extent that electricity impacts on the cost per hectare of irrigation water from SunWater is illustrated by the SunWater forecast electricity cost for 2011 -12 which was \$29.12/Ml (page 99 of the QCA Irrigation Price Review: 2012-17). Total channel water charges for 2011-12 calculated on the basis of access and usage cost per hectare including fixed charges (Part A & C) \$ 46.40/Ml and usage charges (Part B & D) \$ 31.72/Ml were \$78.12/Ml. This indicates that the forecast electricity component of the 2011-12 channel water charge was 37.27% of the total \$/Ml cost to farm. It is shown in Table 3 that the recommended (A & C +

B & D) 2012-13 bundled charge is 49.2% higher than the comparable charge in 2006-7 and the proposed price path increases the bundled charge by a further 19.1%.

When data presented in the QCA final report Irrigation Water Price Review 2012-17 is analysed it indicates that the average electricity component of total SunWater operating costs from 2006-07 to 2011-12 was 28.49% and average electricity cost as a component of the recommended price path (2012-13 to 2016-17) is 39.71%.

**Table 3: Actual and recommended water price (QCA report)**

Actual prices \$/ML						Recommended prices \$/ML					
	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
<b>(Part A)</b>	34.4	36.96	40.32	41.6	42.88	46.4	37.3	40.29	43.39	46.63	48.87
<b>(Part B)</b>	24.57	26.4	28.81	29.72	30.62	31.72	50.68	51.95	53.25	54.58	55.94
	58.97	63.36	69.13	71.32	73.5	78.12	87.98	92.24	96.64	101.21	104.81

It is shown in Table 4 that the direct cost in \$/ML of irrigation water applied arising from the electricity contribution to total operating costs of the Bundaberg Irrigation Distribution Scheme is a substantial constraint to the productivity and profitability of the Bundaberg sugar industry.

**Table 4: Electricity component of SunWater bundled price (\$/ML)**

2006-07 to 2011-12 Actual prices \$/ML	2012-13 to 2016-17 Recommended prices \$/ML
Average cost = \$69.07	Average cost = \$96.57
Electricity % of operational cost = 28.49%	Electricity % of operational cost = 39.71%
Average electricity cost \$/ML=\$19.67	Average electricity cost \$/ML=\$38.34

### **Impact on Gross Margin**

Since 2008-9 Bundaberg cane farmers have had their potential gross margins eroded by up to 20% as a direct result of energy driven pricing. Current proposals have the potential to further reduce their disposable income by an additional 12% over the next three years.

The following detailed marginal analysis reviewed five scenarios based on Bundaberg sugarcane farming practice. Variable cost including harvesting, planting, fertiliser and chemicals were based on 2012 expenditure values and remained constant for each scenario.

Variable irrigation costs (\$/ML) included the following:

- Specific yearly access and usage charge for the channel water supply;
- Electricity used for pumping based on average district audit data;
- Labour and infrastructure maintenance \$/ML of water pumped.

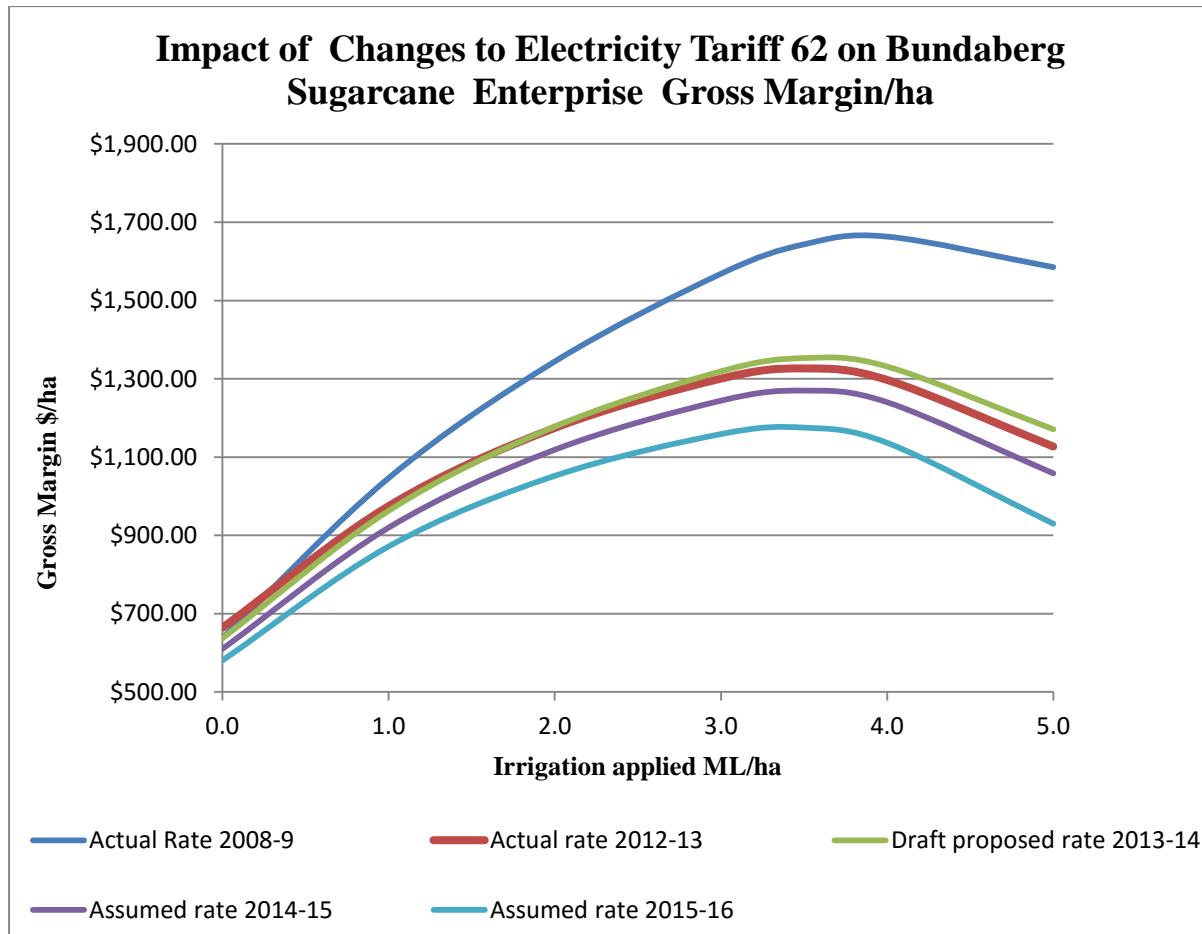
Water pricing and pumping costs for each period were taken from data already shown in this paper (QCA report in to water pricing and pumping cost from on farm system audits)

The gross margin analysis shown in Table 5 and Figure 2 illustrates the dramatic impact that the recent and proposed energy dominated price path is imposing on the Australian Sugar Industry.

**Table 5: Detailed analysis of potential Bundaberg cane farm gross margin (\$/ha) based on actual and assumed electricity tariff rates**

Irrigation ML/ha	Actual Tariff 2008-9	Actual Tariff 2012-13	Draft Tariff 2013-14	Assumed Increased tariff 2014-15	Assumed Increased Tariff 2015-16
<b>0.0</b>	\$637.82	\$664.70	\$637.30	\$610.20	\$580.70
<b>1.0</b>	\$1,046.31	\$974.96	\$963.04	\$919.89	\$871.92
<b>2.0</b>	\$1,344.10	\$1,174.52	\$1,178.08	\$1,118.88	\$1,052.44
<b>3.0</b>	\$1,568.09	\$1,300.28	\$1,319.32	\$1,244.07	\$1,159.16
<b>3.5</b>	\$1,643.19	\$1,326.26	\$1,353.04	\$1,269.77	\$1,175.62
<b>4.0</b>	\$1,662.93	\$1,296.89	\$1,331.41	\$1,240.11	\$1,136.73
<b>5.0</b>	\$1,584.90	\$1,126.95	\$1,171.15	\$1,058.40	\$930.05

**Figure 5 Impact of electricity tariff on Bundaberg sugar industry gross margin**



## **Conclusion**

The Australian sugar industry is a major Queensland industry with a demonstrated economic multiplier effect on the local and national economy of around seven times.

In the Bundaberg region the sugar industry supports local growers and their families as well as directly employing farm labour, trade qualified workers in mills and plant operators during harvest, etc. Indirect employment in retail outlets supplying farm input supplies, groceries, cars, clothes and so on to sugar industry employees and stakeholders also utilises the local workforce.

In the Bundaberg mill area the long term future of the sugar industry and ultimately the diversified work force that depends on this industry will be determined by the viability of on farm irrigation. Irrigation is essential to produce sugarcane at Bundaberg and without viable irrigation the industry will decline.

Investment in irrigation infrastructure is a long term strategy and returns need to be sustained over a long term to justify the commitment. The broader employment aspects and the longer term sustainability of farming enterprises in regions like Bundaberg needs to be considered when developing price paths to full cost recovery.

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