POSTER SUMMARY

ELECTRCITY TARIFF INCREASES: THE IMPACT ON IRRIGATORS?

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Abstract

Until recently the cost of electricity in South Africa was arguably rated amongst the cheapest in the world. However, there have been recent tariff increases, including 14.2% effective from 01 April 2008, 34.4% effective from 01 July 2008 and a further 33.6% increase on 01 July 2009. In addition, a 25% increase each year over the next three years starting on 01 April 2010 was approved subsequent to this study. The hypothesis investigated in this communication was that the increase in electricity tariffs has impacted substantially on the profitability of farmers and poses a serious threat to irrigators. The *Irriecon V2* decision support tool was used to quantify the impact of the electricity tariff increases. A semi-permanent sprinkler irrigation system, capable of delivering 48 mm on a 10 day cycle, was designed for a 60 ha block. Heatonville weather data for the 1998/99 cropping season were used in the *ZIMsched 2.0* model to generate a soil water balance with realistic irrigation applications. The cost of electricity for the simulated irrigation applications was then determined for the past three electricity tariff increases for the Landrate, Ruraflex and Nightsave Rural options. The electricity bill for the 60 ha field would have increased from R74,889 to R134,971 on the Landrate option. Similar increases were obtained for the Ruraflex and Nightsave Rural options.

Keywords: irrigation, electricity tariffs, irrigation operating expenses

Introduction

In previous years, the cost of electricity in South Africa was arguably rated amongst the cheapest in the world. This has changed in recent times. The country's energy supplier, Eskom, has struggled to meet the electricity demands. As a result, a number of increases in the electricity tariffs have been affected to mitigate the situation. Increases in tariffs included 14.2% effective from 01 April 2008, 34.4% effective from 01 July 2008 and a further 33.6% increase on 01 July 2009. In addition, Eskom submitted a Multi Year Price Determination (MYPD) proposal to the National Energy Regulator of South Africa (NERSA), requesting a 45% tariff increase per annum for the next three years (www.eskom.co.za/tariffs). Subsequent to this study, a 25% tariff increase, each year for the next three years, effective from 01 April 2010, has been approved. In light of the economic climate, the past and pending increases in electricity tariffs are expected to impact substantially on farm profitability. This study was aimed at quantifying, for a specific scenario, the increase in the electricity bill over the last three tariff increases.

Materials and Method

A hypothetical semi-permanent irrigation system was designed for a 60 hectare field in the Heatonville area in Northern KwaZulu-Natal. The irrigation system was capable of delivering 48 mm of water on a 10 day cycle and was fairly representative of the Heatonville area. For the designed 60 hectares and 1000 m main line, the pumping system was required to pump a flow of 116.42 m^3/h at a head of 90.74 m which required a power rating of 45.7 KW. It was assumed that a 50 kVA, 3 phase transformer was installed on the farm. Irrigation applications occurred in two 12 hour sets per day.

ZIMsched 2.0, a daily soil water balance model, was used to determine seasonal irrigation amounts (Lecler, 2004) assuming a soil with a total available water (TAW) content of 76 mm was refilled when 45.6 mm was depleted (60% of TAW). A gross irrigation application of 48 mm was reduced by 10% to account for wind drift and evaporative spray losses. In this case, weather data for the 2004/05 cropping season was obtained from the Pogela weather station in Heatonville. A combination of the system pumping specifications and annual irrigation demand was then used in the *Irriecon V2* model (Armitage *et al.*, 2008) to determine the cost of electricity for the prescribed irrigation applications as determined by *ZIMsched 2.0*. The annual electricity costs were determined with tariff prices for the 2007/08, 2008/09 and 2009/10 years to demonstrate the impact of increasing electricity tariffs on farmers. Electricity costs were determined for the Landrate, Ruraflex and Nightsave options.

Results

Rainfall of 755 mm was recorded for the 2004/05 crop season. The *ZIMsched 2.0* model predicted that the annual irrigation demand, taking into account rainfall, was an additional 998 mm. A management factor of 0.7 was applied to the simulated yields and the resultant cane yield was predicted to be 89.6 tons/ha. Applying 807.84 mm of irrigation water over 60 ha translated into the pumping of 589,671 m^3 of water per annum which consumed 231,472 Kilowatt hours (kWh). The fixed, variable and total cost of electricity for this system within the specified conditions is shown in Table 1. The ‘variable costs’ refer to the Rands charged per kWh for the energy actually consumed, while ‘fixed costs’ refer to a levy charged for the use of infrastructure. It should be noted that fixed costs are payable irrespective of whether electricity was consumed or not.

As shown in Table 1, the electricity bill for the 60 ha block would have increased from R63,582 to R132,266 on the Ruraflex option. Similarly, the increase for the Landrate and Nightsave Rural options were R74,889 to R134,971 and R62,710 to R129,483, respectively. On average, the cost of electricity was increased from R0.32 to R0.58/kWh. The results indicate that under these constraints, the electricity bill for a 60 ha farm would have almost doubled over a period of three years.

Conclusion

In light of the above findings, and in the context of the further increases in electricity tariffs in the near future, the profitability of irrigated farms with low margins is under threat These preliminary findings highlight the need to develop and implement strategies to assist growers to overcome these difficult times.

Table 1. Breakdown of model predicted electricity costs for irrigation on 60 ha in the Heatonville area based on weather data from the 2004/05 cropping season.

Ruraflex					
Fixed Costs[1]					
	Service	Admin.	Network		**Total**
2007/2008	R 1,507	R 2,205	R 2,490		**R 6,202**
2008/2009	R 2,022	R 2,960	R 3,336		**R 8,318**
2009/2010	R 2,683	R 767	R 4,560		**R 8,009**
Variable Costs[2]					
	Reactive Energy	Active Energy	Voltage Surcharge	Transmission Surcharge	**Total**
2007/2008	R 896	R 47,636	R 8,277	R 570	**R 57,380**
2008/2009	R 1,203	R 63,925	R 11,107	R 765	**R 77,000**
2009/2010	R 1,532	R 103,517	R 17,974	R 1,234	**R 124,257**
Ruraflex					
Total costs[3]					
2007/2008					R 63,582
2008/2009					R 85,318
2009/2010					R 132,266

Landrate			
Fixed Costs[1]			
	Service	Network	**Total**
2007/2008	R 2,340	R 2,460	**R 4,800**
2008/2009	R 3,096	R 3,254	**R 6,350**
2009/2010	R 3,449	R 4,212	**R 7,661**
Variable Costs[2]			
	Active Energy		**Total**
2007/2008	R 70,090		**R 70,090**
2008/2009	R 93,978		**R 93,978**
2009/2010	R 123,310		**R 123,310**
Landrate			
Total costs[3]			
2007/2008			R 74,889
2008/2009			R 100,329
2009/2010			R 134,971

Nightsave Rural					
Fixed Costs[1]					
	Service	Admin	Network		**Total**
2007/2008	R 1,507	R 2,157	R 1,890		**R 5,555**
2008/2009	R 2,022	R 2,891	R 2,532		**R 7,445**
2009/2010	R 2,683	R 767	R 3,258		**R 6,707**
Variable Costs[2]					
	Energy Demand	Active Energy	Voltage Surcharge	Transmission Surcharge	**Total**
2007/2008	R 22,231	R 25,791	R 8, 635	R 499	**R 57,156**
2008/2009	R 29,836	R 34,637	R 11, 592	R 670	**R 76,736**
2009/2010	R 42, 327	R 60,952	R 18, 431	R 1, 065	**R 122,775**
Nightsave Rural					
Total costs[3]					
2007/2008					R 62,710
2008/2009					R 84,181
2009/2010					R 129,483

1 Fixed costs – Infrastructure costs that are charged irrespective of whether electricity is consumed or not.

2 Variable costs – Cost of actual energy consumed charged in Rand per Kilowatt hour.

3 Total costs – Sum of fixed and variable costs.

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