Pioneer Valley Water Board

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Ref: GD:10/15/10

12 November 2015

Queensland Productivity Commission
PO Box 12112
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Submitted via QPC website.

Dear Commissioners,

Re: Issues Paper on Electricity Pricing, October 14 2015

Thank you for the opportunity afforded Pioneer Valley Water (PVWater) in early November to present to the Queensland Productivity Commission (QPC) in Townsville. This submission is forwarded in support of that presentation and elaborates on the issue of upwardly spiralling electricity costs as they negatively impact productivity in the sugar industry in the Pioneer Valley, west of Mackay, Queensland.

While a large part of the empirical data presented here is intentionally focussed on the case study of a particular irrigation distribution entity, this submission is not intended to imply that PVWater and the irrigation network it services should be considered in isolation of the broader community.

It is clear however, that without intervention in proposed electricity pricing, *irrigation in this region is at serious risk*. The situation is critical for the farming community serviced by PVWater, the local sugar milling industry reliant on the productivity benefits of irrigation, and the regional businesses and community looking to those industries for their income.

Background

PVWater is a not for profit entity operating an irrigation water supply network at Mackay supplying 250 customers for irrigation of sugar cane (refer Figure 1, page 2). The irrigation supply *supplements* effective rainfall, and the network was established to aid with crop survival and increased productivity as part of the Teemburra Dam Project completed in the late 1990's. Funding for the irrigation network (current replacement cost $47.4 million) and for the balance of the Teemburra Dam Project was on a joint venture basis between the Commonwealth and Queensland Governments, Mackay Sugar Limited and the irrigation network customers. The total project cost in 1993 dollars was $56.7 million and was contributed by the joint venture partners as follows:

Commonwealth Government - $10.0 million
Queensland Government - $31.7 million
Mackay Sugar Limited - $10.0 million
Irrigation network customers - $5.0 million

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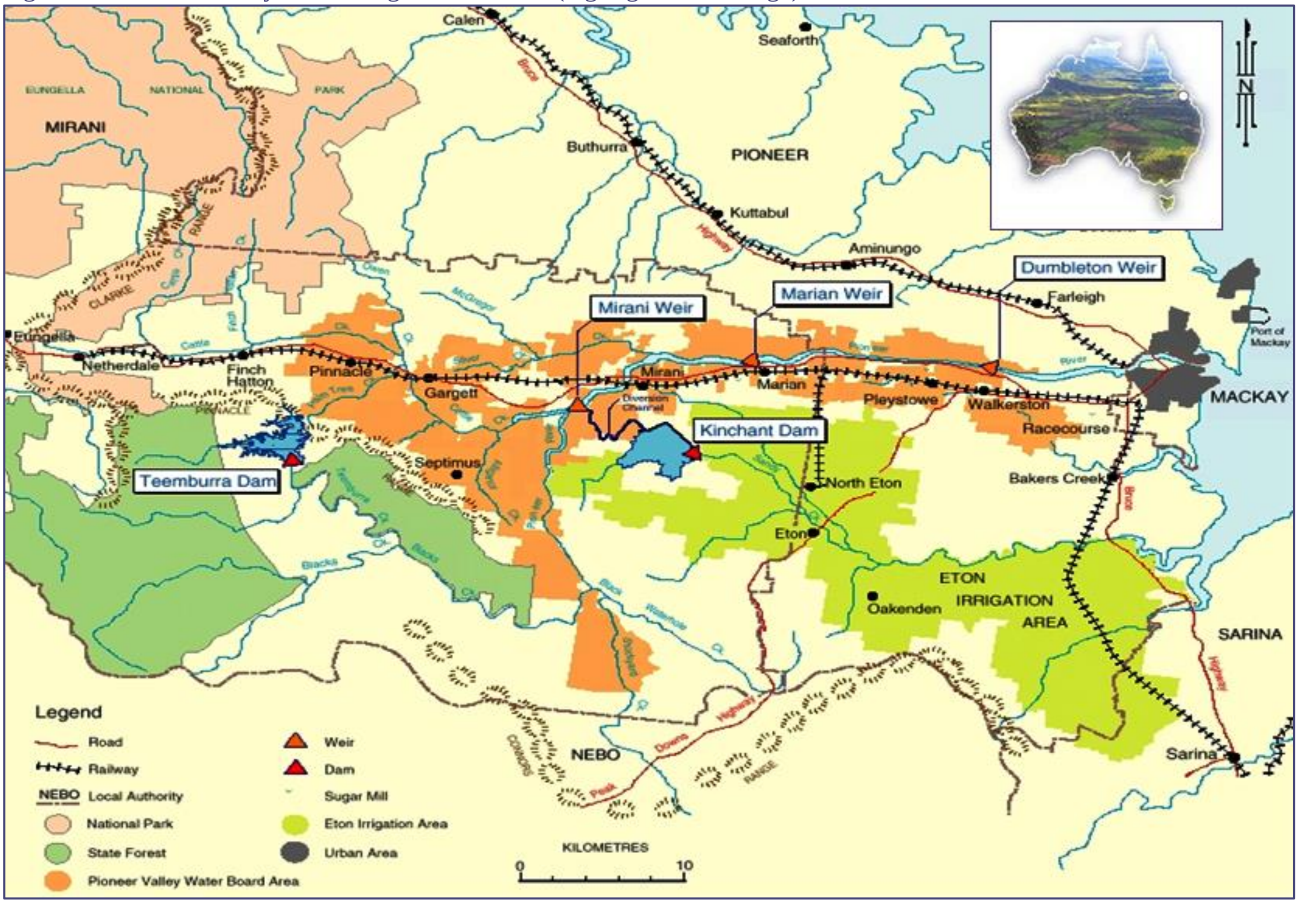
Figure 1 – Pioneer Valley Water irrigation network (highlighted in orange).



The irrigation network was designed to utilise off-peak electricity tariffs, not only to minimise electricity costs, but to maximise efficient use of both the electricity network infrastructure and the available water resource. Irrigation customers similarly operate their individual on-farm reticulation infrastructure during off-peak electricity tariff periods, maximising resource efficiency by avoiding higher evaporation rates and spray drift associated with application of irrigation water during hotter, generally more windy daylight hours. Once again, this also flattens the load profile for electricity network infrastructure.

The irrigation network comprises a number of separate reticulation schemes of which three (3) include major pumping stations. Brief details of the pump arrangements for these three schemes are as shown in Table 1.

Table 1 – Pump details for PVWater's electricity reliant reticulation schemes

Reticulation Scheme	Pump Details
Palmyra	3 x 180 kW submersible pumps delivering from the Pioneer River into Bakers Creek
Septimus	Septimus pump station: 3 x 180 kW main submersible pumps delivering from Cattle Creek through a rising main to the lower balancing storage (LBS) Septimus Re-lift pump station: 2 x 140 kW re-lift submersible pumps delivering from the LBS through a rising main to the upper balancing storage (UBS) Septimus Booster pump station: 4 x 15 kW pumps on one of five lateral pipelines
Silver McGregor	3 x 180 kW submersible pumps delivering from Cattle Creek into Silver and McGregor Creeks

The *Septimus* irrigation scheme in particular was conceived with off-peak electricity tariffs being a critical factor in design and feasibility considerations. Balancing storages were included to meet minimal day-time demand, allowing pump and pipeline capacities to be tailored to enable an extremely high percentage of night-time pumping. On farm usage patterns, themselves targeted at off-peak electricity tariffs, further contributed to design outcomes. Major asset life expectancy at construction (pump stations, storages and pipelines) was in the order of 50-80yrs. The inclusion of the two balancing storages at Septimus added considerably to the initial capital cost of the scheme, but this was offset by lower ongoing operating costs expected to be realised through ongoing access to off-peak electricity tariffs. PVWater also made a significant capital contribution towards upgrade of the electricity network in the area to address pre-existing supply interruption issues.

Historic electricity consumption

Table 2 (below) shows electricity consumption at the pump stations for the various schemes from 2005/06 to 2013/14 inclusive. Included are the percentage of peak tariff electricity utilised and the electricity cost component of PVWater usage charges to customers in the applicable scheme. This information clearly demonstrates:

- the high variability in water use (and associated electricity consumption) in supplementary irrigation schemes;
- significant increases in electricity costs for the schemes commencing from 2012/13; and
- the success of the design philosophy for the Septimus irrigation scheme in targeting off-peak electricity tariff usage, and the implied dependency on those tariffs.

Table 2 – PVWater pump stations 2005/06-2013/14: Electricity consumption / % peak electricity tariff usage / cost

	Palmyra			Silver McGregor			Septimus		Septimus Re-lift		Total
Year	MWh	%Peak	$/ML	MWh	%Peak	$/ML	MWh	%Peak	MWh	%Peak	$/ML
05/06	156	42	10.30	N/A	N/A	N/A	155	13	89	7	18.00
06/07	60	42	10.80	7	47	14.35	140	13	65	10	18.00
07/08	125	39	11.10	83	35	14.75	125	22	74	17	18.50
08/09	145	38	11.65	103	38	15.45	135	12	95	10	19.40
09/10	233	39	13.40	215	38	17.77	243	11	170	10	22.31
10/11	21	44	15.18	7	53	20.13	17	3	N/A	N/A	25.27
11/12	139	41	16.18	69	44	21.46	88	8	68	7	26.94
12/13	151	41	18.60	99	33	24.00	140	8	95	9	31.00
13/14	217	43	20.50	170	36	27.00	241	16	170	17	34.10

Historic electricity tariffs

From commissioning of the irrigation network up to 2012/13 when the Queensland Competition Authority (QCA) restructured electricity tariffs, all PVWater electricity consumption was under Business tariff 22 (T22). As discussed above, that tariff provided incentives for off-peak usage which was a guiding design principle for the PVWater irrigation network and in particular, the Septimus irrigation scheme.

The QCA restructured T22, saw a significant price increase in the off-peak electricity tariff which would have increased PVWater pumping costs by up to 50%. Further, in contrast to the original T22, the restructured tariff was subject to an annual consumption threshold, and use over 100MWh per annum triggered a mandatory shift to a large business tariff, with associated ‘demand’ and ‘daily service fee’ components. Fortunately, the QCA recognised the dramatic impact of moving to cost reflective tariffs, and with the continuation of pre 2012/13 tariffs on a transitional basis, PVWater was able to move to Irrigation Tariff 62 (T62) which maintained a clear differential between peak and off-peak tariffs.

PVWater continues to model electricity costs for various tariffs based on previous years’ consumption history. To date this has shown T62 to be the optimum tariff for all schemes during the transitional period. **It needs to be noted here that *the rate of increase of electricity charges under the transitional T62 is already severely impacting productivity*, and we are still 5 years from the goal of cost reflective pricing!**

Impacts on irrigation water use

Increasing costs for both the electricity component of water charges for supply from PVWater, and for electricity use associated with on-farm irrigation infrastructure, are already contributing to a concerning reduction in water applied to sugar cane crops in the PVWater irrigation network area (refer Table 3, page 4). Electricity comprises a significant component of production costs and as price-takers, many irrigators are choosing to gamble on rain falling rather than switch on electric irrigation pumps. Sugar cane is a robust crop and will not necessarily die under this strategy, but yield is dramatically reduced due to a lack of water reaching the crop in peak growing periods.

The period October to December 2013 saw very low rainfall in the region which would have normally resulted in high irrigation water use. Table 3 compares total water use for the PVWater irrigation network over the October to December quarter for years where rainfall was similar or greater than in 2013, and where full allocation from the scheme was available to customers. Also included for those years are the average electricity costs per megalitre for the three areas where irrigation water is pumped by PVWater.

Table 3 – Irrigation water use declining with increasing electricity costs

Year	2001	2002	2009	2013
Rainfall October to December (mm)	176	104	199	87
Total water use October to December (ML)	12,260	17,531	11,219	9,073
PVWater average electricity cost over all schemes ($/ML)	12.55	12.55	17.22	26.27

Clearly, future increases in electricity costs, *even of a transitional nature* can only exacerbate the incentive for farmers to withdraw from irrigation, with obvious detrimental outcomes for productivity, the regional sugar industry, and the wider community.

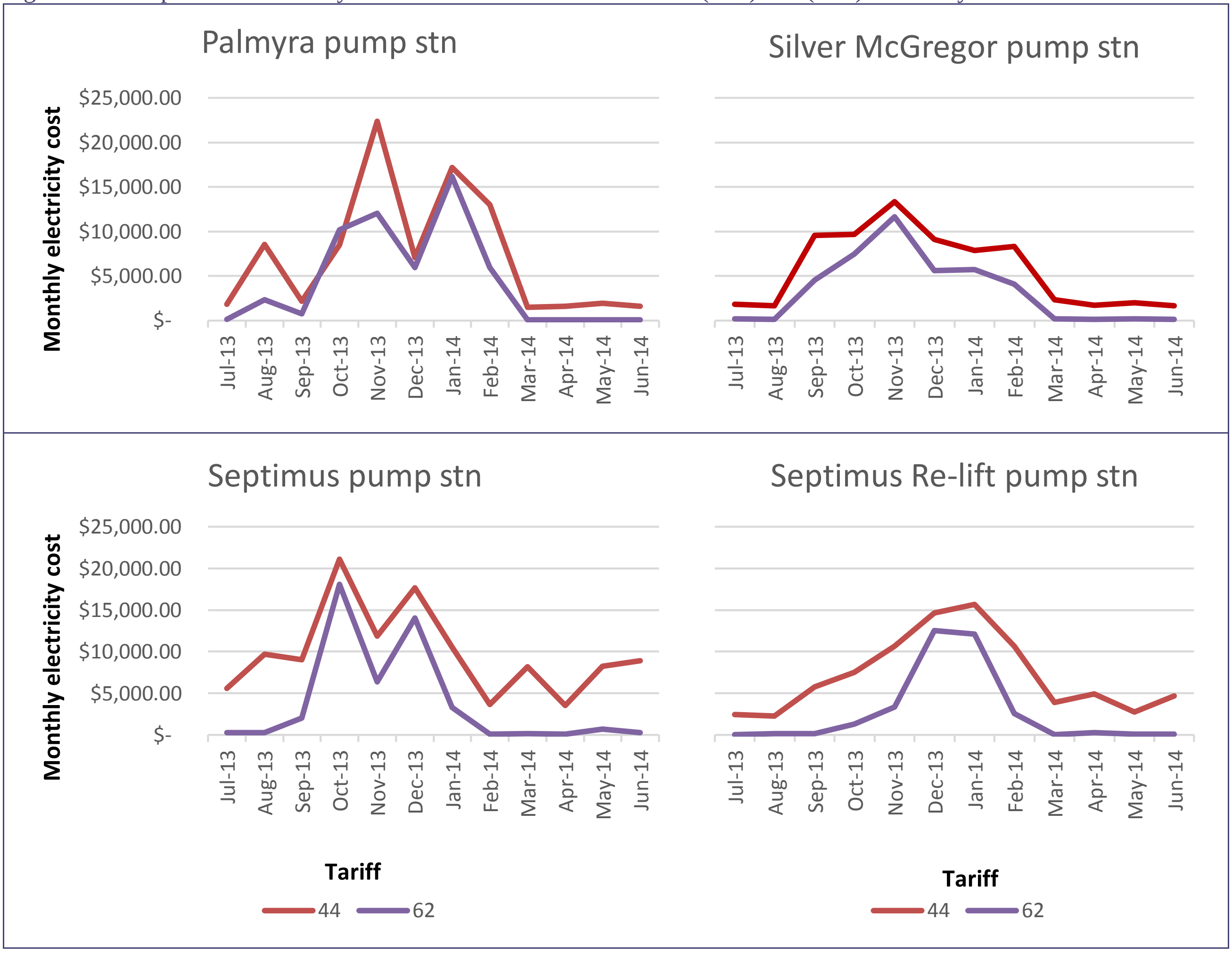
Modelling electricity costs for PVWater

Cognisant of existing electricity pricing impacts, and recognising the implicit risks to productivity, PVWater has taken steps to better understand current and future impacts of electricity pricing, with a view to developing mitigation strategies.

It is understood that from 2020 with transitional electricity tariffs removed, PVWater as a business with usage exceeding 100MWh/annum, will move from T62 to Large Business Tariff 44 Demand Small (T44).

Modelling was conducted in conjunction with Ergon Energy to compare costs for PVWater between T62 and T44 based on actual electricity consumption data from 2013/14 and comparative electricity pricing for 2014/15 tariffs. The results are charted in Figure 2 (below) and show unsustainable increases in the cost of electricity to customers in all irrigation schemes modelled (Palmyra 63% increase, Silver McGregor 73% increase, Septimus 160% increase). The contrast in cost for electricity in the Septimus irrigation scheme is staggering, moving from $36/ML under T62 to an irrigation scheme crippling $96/ML under T44.

Figure 2 – Comparative electricity costs for PVWater under 2014/15 (T62) and (T44) electricity tariffs



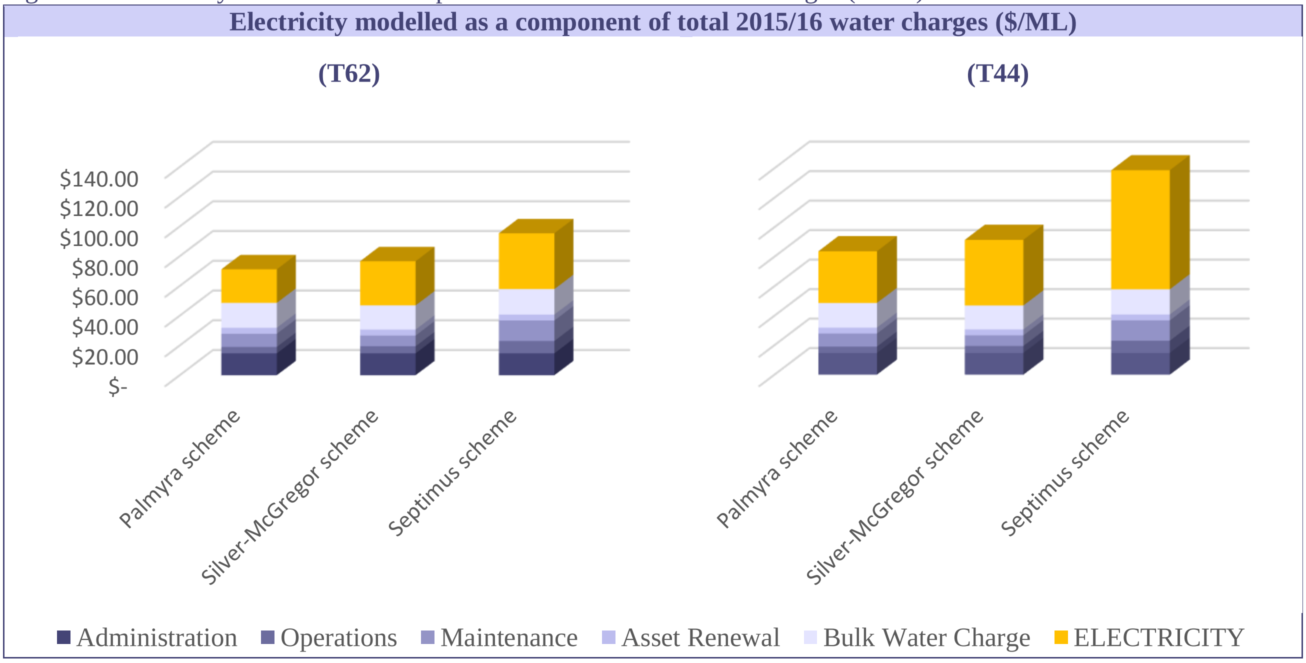
Subsequent to the above modelling, Time of Use Tariff 50 (T50) has been put forward as a possible alternative tariff option. At the outset it is noted that the supplementary nature of irrigation in the region combined with highly variable demand patterns render T50 impractical, given that it relies on reliably predicting and limiting usage seasonally. Revised modelling for the Septimus irrigation scheme incorporating T50 and updated to rely on 2013/14 irrigation water usage and 2015/16 electricity pricing revealed the cost outcomes shown in Table 4 (below).

Table 4 – Septimus irrigation scheme electricity tariff comparison

Pump Station	2014/15 Electricity Consumption (MWh)	Modelled Electricity Cost 2015/16 T62 ($)	Modelled Electricity Cost 2015/16 T44 ($)	Modelled Electricity Cost 2015/16 T50* ($)
Septimus	272	53,108	130,803	108,393*
Septimus Re-lift	212	42,403	100,871	90,663*
Total	484	95,311	231,874	199,056*
* T50 modelling assumes summer demand use (10am to 8pm weekdays).				

Although T44 has a much lower unit charge for electricity than T62, the associated demand charge and daily service fee severely penalise businesses providing water in supplementary irrigation schemes. These types of schemes are much more sensitive to fixed costs simply because they have a low megalitre/hectare allocation rate. The large comparative costs of electricity as a component of overall water charges under T62 and T44 are illustrated in Figure 3 (below), and clearly show why upward movements in electricity pricing are so devastating to productivity.

Figure 3 – Electricity modelled as a component of total 2015/16 water charges ($/ML)



Exploring energy and water efficiency alternatives

In conjunction with Ergon Energy, PVWater has engaged engineering consultants SMEC to investigate existing energy and water use in the Septimus irrigation scheme with a view to maximising efficiency. Although the report from this consultancy has yet to be finalised, initial findings are summarised as follows:

- Existing operations are efficient within given infrastructure constraints and design parameters;
- Options for increased efficiency which will not avoid T44 post 2020 include;
    - Potential exists for efficiency gains in the order of 12-14% through upgrading of pumps and the introduction of variable frequency drives, however an efficiency gain of this size will not enable the scheme to keep consumption below 100MWh/annum, and will accordingly not avoid the move to T44.

- Some additional efficiency gain might be made by increasing existing storage capacity, however given the existing high percentage of off-peak power use, this additional efficiency gain will not keep consumption below 100MWh/annum, and will accordingly not avoid the move to T44.

- Options aired for avoiding the move to T44 post 2020 include;
    - Using diesel as a supplementary energy source to limit draw from the electricity grid to less than 100MWh/annum;
    - Going completely off grid to diesel and solar energy.

Capital expenditure in the Septimus scheme for the above options ranges from $0.37 to $1.50 million. These estimates are based on energy consumption data from 2013/14 when only 44% of allocation was used, and will increase with greater usage.

Where to from here?

On current trends, without intervention and relief from increasing electricity pricing under transitional arrangements, irrigation in this region is at risk. The situation is critical not just for the farming community serviced by PVWater, but also the sugar milling and irrigation infrastructure industries reliant on the productivity benefits of irrigation, and the regional businesses and community looking to those industries for their income.

Electricity tariffs for the agricultural sector need a major re-think by all concerned in the light of their existing and imminent negative impacts, and must recognise:

- irrigation water use efficiency is optimal during existing off-peak electricity periods, particularly night-time, and pricing signals recognising this also increase efficient use of electricity network infrastructure;
- the negative impact of moving to high fixed costs (daily service fee) on seasonal electricity consumers;
- proposed electricity pricing increases under transitional arrangements, and proposed post 2020 tariff arrangements will lead to schemes closing down, risking tens of millions of dollars in existing irrigation infrastructure; and
- there is no capacity within current water charges either to absorb electricity price increases or to raise capital to fund alternative energy or other options to limit the impact of proposed post 2020 electricity tariffs.

We trust that the QPC will give full consideration to the implications of the information we provide here and hope that you will recommend appropriate action to Government accordingly. We will be pleased to provide any clarification or additional information in support of this submission.

Yours sincerely

GS Dawes
ACTING MANAGER