



BBIFMAC INC. 

introducing

# ENERGY EFFICIENCY GAINS FOR AUSTRALIAN IRRIGATORS



Steve Attard  
AgriTech Solutions

# PROJECT OVERVIEW

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This \$1m project runs for 2 years and aims to provide relevant customised information to irrigators that will:

- Improve energy efficiency
- Save money
- Drive innovation & productivity

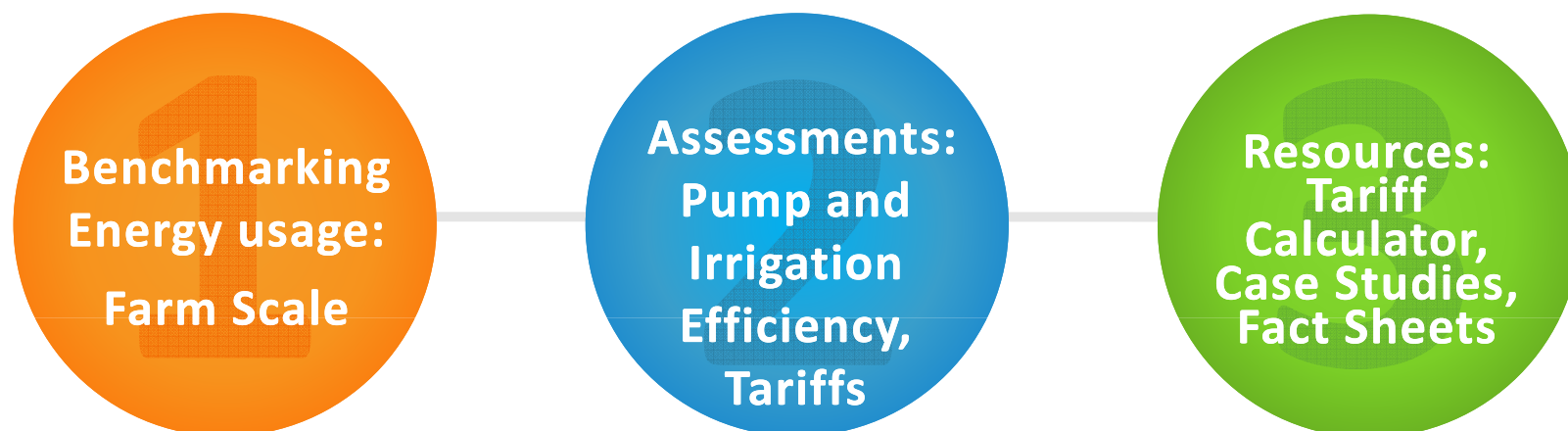
*“No matter how good you get you can always get better, and that’s the exciting part!” – Tiger Woods*

This activity received funding from the Department of Industry as part of the Energy Efficiency Information Grants Program.



**Australian Government**  
**Department of Industry**

# HOW WILL THIS BE ACHIEVED?



Energy Efficiency Gains for Australian Irrigators





# Benchmarking Energy Usage: Farm Scale

Energy Efficiency Gains for Australian Irrigators



# OVERVIEW

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- Development of an on-line benchmarking tool
- Participating growers can view their irrigation energy use and costs over 2 years (2012 & 2013)
- Comparison to other growers in the Burdekin
  - More than 260 assessments conducted to date on more than 130 farms
  - More than 60 growers have attended workshops to learn how to use the tool and view their results
  - Individual results are password protected

# ON-LINE BENCHMARK TOOL



- Website:

[www.bbifmac.org.au](http://www.bbifmac.org.au)



EEGAI page



**Benchmark**



*login*

# ON-LINE BENCHMARK TOOL



It's done. check the summary below, if everything is right, click 'Submit' to save the data to the server.

Region

All

BHWSS

Delta

Mill  
Area

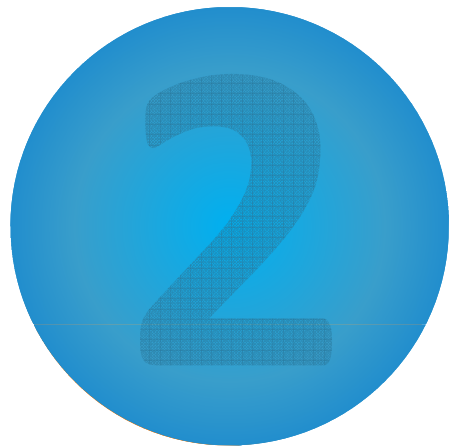
All

Pioneer

Invicta

Kala...

Inke...



## Assessments: Tariffs, Pump & Irrigation efficiency

Energy Efficiency Gains for Australian Irrigators



# Tariff review – whole of farm

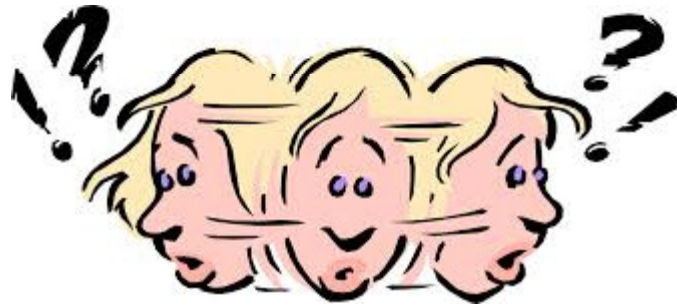
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Tariff 66 Irrigation  
(transitional)

Tariff 65 irrigation Time  
of Use (transitional)

Tariff 62 Farm Time of  
Use (transitional)

Tariff 21 General Supply  
(transitional)

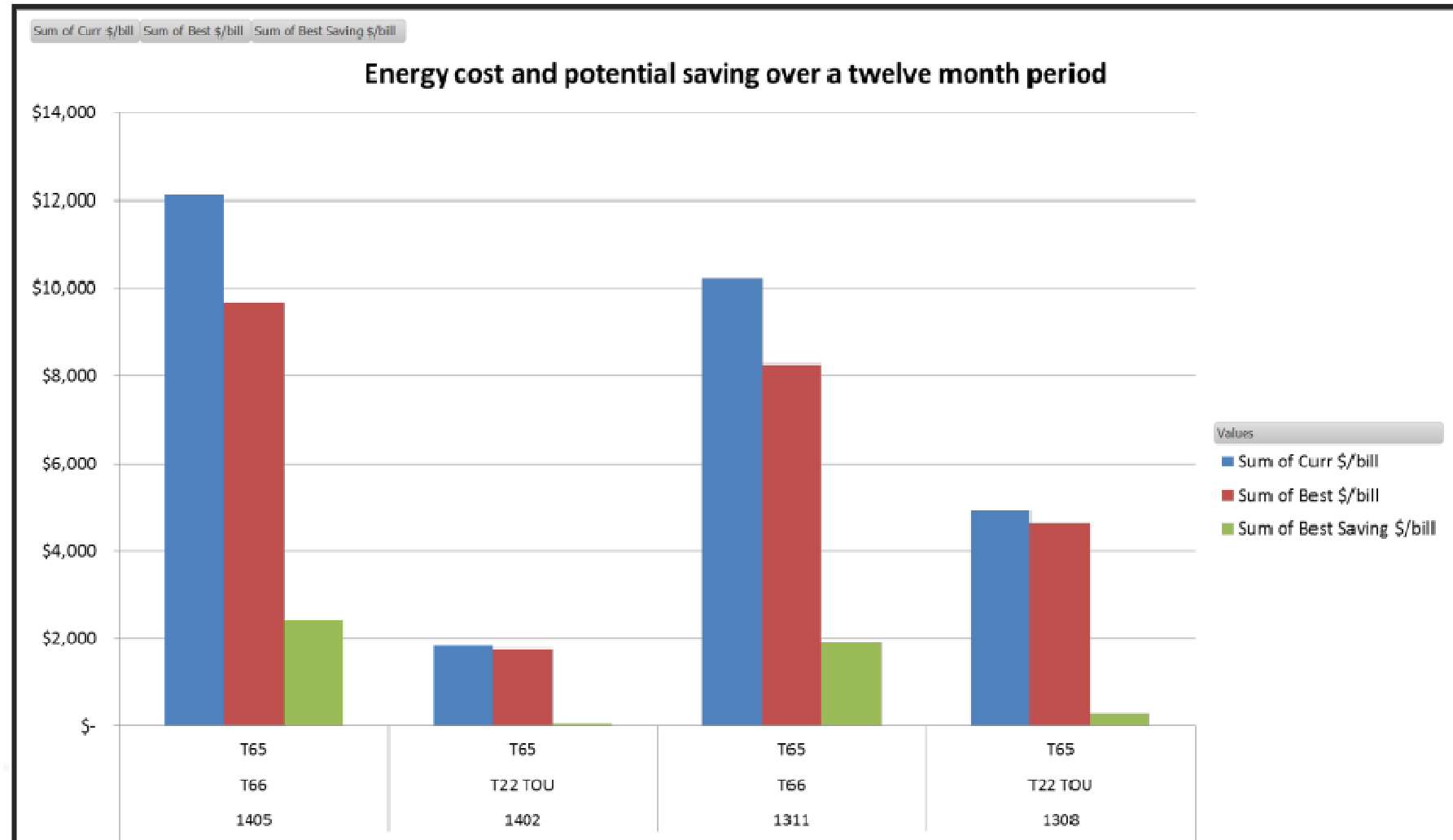


Tariff 20 General supply  
(Small business)

Tariff 20 (large) General  
supply (transitional)

Tariff 22 General supply  
time of use

# Tariff review – whole of farm



# Tariff review – savings per quarter

Farmer: A

- The same tariff was used over 4 quarters.
- 4 accounts identified has having the correct tariff.
- 6 accounts would benefit from a tariff change.
- **Amounts in red** indicate the proposed tariff causes a higher cost than the current tariff.

Pump											
Billing Period	Pump 1	Pump 2	Pump 3	Pump 4	Pump 5	Pump 6	Pump 7	Pump 8	Pump 9	Pump 10	Total
1307	\$ 974	\$ -	\$ 380	\$ 44	\$ -	\$ 249	-\$ 37	\$ -	\$ 221	\$ -	\$ 1,931
1310	\$ 500	\$ -	\$ 353	\$ 268	\$ -	-\$ 49	-\$ 400	\$ -	-\$ 26	\$ -	\$ 646
1402	\$ 817	\$ -	\$ 803	\$ 738	\$ -	\$ 33	-\$ 86	\$ -	\$ 110	\$ -	\$ 2,415
1405	\$ 174	\$ -	\$ 133	\$ 55	\$ -	-\$ 92	\$ 653	\$ -	-\$ 130	\$ -	\$ 793
Total	\$ 2,465	\$ -	\$1,669	\$1,204	\$ -	\$ 141	\$ 131	\$ -	\$ 175	\$ -	\$ 5,785

# Pump efficiency assessment

- Farmer B – iron bacteria
  - Motor size 18.64 kW

Flow (L/s)	31
Energy consumption (kWh/ML)	96.4
Energy cost (\$/ML)*	23.50
Energy cost (\$/ha/year)*	577

\* Based upon T65, equal usage during peak and off-peak times.





# Pump efficiency assessment

- Farmer B – iron bacteria
  - Motor size 18.64 kW

	Before	After	Difference (%)
Flow (L/s)	31	59	+90%
Energy consumption (kWh/ML)	96.4	58.7	-39%
Energy cost (\$/ML)	23.50	14.31	-39%
Energy cost (\$/ha/year)	577	329	-43%

\* Based upon T65, equal usage during peak and off-peak times.



# Pump efficiency assessment



# Pump efficiency assessment

- Farmer C – operating at different duties

Butterfly valve setting	Amps	Energy used per hour (kW)	Cost per hour (\$/h)
half open	Lowest	18.6	\$3.07
2/3 open		19.7	\$3.24
fully opened	highest	20.5	\$3.38
Difference (%)		+10%	+10%



# Pump efficiency assessment

- Farmer C – operating at different duties

Butterfly valve setting	Amps	Energy used per hour (kW)	Cost per hour (\$/h)	Flow (L/s)	Cost per ML (\$/ML)
half open	Lowest	18.6	\$3.07	54	\$15.78
2/3 open		19.7	\$3.24	63	\$14.30
fully opened	highest	20.5	\$3.38	96	\$9.79
Difference (%)		+10%	+10%	<b>+78%</b>	<b>-38%</b>



## Irrigation review

- Purpose: *to identify cost savings from unnecessary over irrigation.*
- Irrigation practices at a paddock scale
- Typical irrigation management during peak crop water use
- Crop water demand = 56 mm per week
- Irrigation cycle = 7 days

## Irrigation review – paddock scale

	<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>
Amount applied per irrigation (mm)	75	138	121	83	78
Prop. Amt applied per irrig (mm)	63	82	71	71	72
Prop. Volume reduction (mm)	11	56	50	11	6
<b>Energy Cost – before (\$/ha/irrigation)</b>	<b>12.80</b>	<b>33.94</b>	<b>19.36</b>	<b>13.92</b>	<b>11.14</b>
<b>Energy Cost – after (\$/ha/irrigation)</b>	<b>11.24</b>	<b>20.78</b>	<b>12.15</b>	<b>12.36</b>	<b>10.35</b>
<b>Energy cost saving (\$/ha/irrigation)</b>	<b>1.56</b>	<b>13.16</b>	<b>7.21</b>	<b>1.56</b>	<b>0.79</b>
<b>Energy cost reduction (%)</b>	<b>12%</b>	<b>39%</b>	<b>37%</b>	<b>11%</b>	<b>7%</b>



## **Resources:** Tariff calculator, Case studies, Fact sheets

**Energy Efficiency Gains for Australian Irrigators**



# TARIFF CALCULATOR

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- A very popular tool and is already saving growers money
- Accessible via the project webpage
- Growers are shown how to use it in the workshops
- Growers enter data from their power bills to check whether they are on the best tariff for their irrigation use

• <http://eegai.nceastg.usq.edu.au/eegai/index.php/resources/calculators/>

- **Savings of up to \$7,000 a quarter have already been identified by several participating growers**

# Other resources

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- Case studies

- Friction losses/increased energy consumption due to iron bacteria build up, collapsed underground pipes and use of valves
- Tariff comparisons and savings
- Improvements to irrigation application
- Bore design and maintenance

- Fact Sheets

- Electricity Bills and Meter Readings
- Irrigation Tariff Options and Information
- Improving Irrigation Efficiency

# PROJECT FINDINGS

- Growers are time poor and don't have time to review energy use across their enterprise on a regular basis
- Information on irrigation efficiency is difficult to find
- There is conflicting information from the energy provider
- Most growers aren't able to compare themselves to others
- Growers have very low knowledge about the different tariffs
- There is misinformation about pump efficiency and energy use
- A large proportion of growers are applying more water than their crop needs

Energy Efficiency Gains for Australian Irrigators



# FEEDBACK FROM PARTICIPANTS

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- ***“This has been a real eye-opener for me – I never really knew how I compared to others in terms of pumping costs.”*** Home Hill grower
- *“This is a very important tool to carry into the future. I will endeavour to use it. I have had no active input to the management of electricity costs on my farm - until now I have just paid the bills and that's all.”* Airville grower.
- ***“I will be looking at using this a lot as part of my business management.”*** Home Hill grower
- *“In one word the thing I have got out of this workshop is enlightenment.”* Airville grower
- ***“I have already identified a potential saving of \$1,800 a quarter just by changing tariffs for one pump. I am really surprised and now am interested to see what further savings can be made on all my other pumps.”*** Home Hill grower
- *“This is an extremely valuable exercise – it was really beneficial to me – all growers should get involved.”* Airville grower



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