



EnergyProof - Aquaculture

Assessing Energy Efficiency at your site – Practice Guide

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Contents

1	Purpose of this guide	1
2	Who will benefit from this guide?	1
3	Business drivers	1
4	Energy efficiency – practices for business	2
4.1	Case example: Jet aerators investigated as potential energy savings opportunity at Pacific Reef Fisheries	3
4.2	Practice steps.....	5
4.3	Supporting tools and templates related to the practice steps.....	6
4.4	Additional websites for reference / general knowledge.....	6
	http://www.worldfishcenter.org/resource_centre/WF_2821.pdf	6

1 Purpose of this guide

Energy and water efficiency makes good business sense as well as delivering better outcomes for the environment. The opportunity to save 10-30% or more on your utility bills is a common benefit following an energy assessment. Most businesses have had some exposure to energy and water efficiency through audit programs, water allocation processes, government funding schemes, or simply through their own practices and efficient use of resources.

This guide seeks to provide practical and useful tools and tips to help business maximise the value of their efficiency initiatives by engaging others in the business to progress implementation or to conduct further investigations in order to meet hurdle rates to justify these investments.

2 Who will benefit from this guide?

Primarily Owners and/or Site Managers who want to identify and implement measures that reduce energy consumption and water usage.

3 Business drivers

The business benefits of implementing energy and water efficiency include:

1. Cost savings
2. Improved productivity
3. Improved security of supply
4. Lower risk of exposure to carbon prices and supply chain demands
5. Lower greenhouse gas emissions

4 Energy efficiency – practices for business

This guide presents three key practices that will help business to better understand the opportunities and realise the benefits of energy and water efficiency for their business. These practices are:

1. Implement a regular planning process for energy and water efficiency initiatives.
2. Identify and assess potential saving initiatives.
3. Implementation of efficiency opportunities, and measurement and verification of savings.

4.1 Case example: Jet aerators investigated as potential energy savings opportunity at Pacific Reef Fisheries

When Pacific Reef Fisheries reviewed their energy baseline as part of the EnergyProof program, the site estimated that pond aeration made up approximately 80% of the total electricity used. Pond aeration is provided by paddle wheel aerators which oxygenate the water for the prawns to grow while simultaneously aiding the breakdown of waste solids. The aerators also mix the water in the pond and concentrate solids into the centre. Based on 24/7 operation across a 180 day period, a single paddle wheel aerator used 6,500 kWh/yr costing \$700/yr at their current electricity rate.

When assessing energy efficiency opportunities for the aeration process, the suggestion was made to use automatic timers to switch off a number of the aerators for up to eight hours per day when oxygen demands were low across the growing season. This opportunity would be easy to implement but only yield a modest saving of approximately \$60 per year per aerator.

However the investigation also highlighted the potential for more significant energy savings via the conversion of paddle wheels to jet aerators. While paddle wheel aerators are relatively cheap and widely used, they tend to have high maintenance and

operating costs, and are prone to biofouling. Jet aerators are more expensive. However experience in the USA has shown greater reliability compared to the paddle wheel, and increased and more uniform dispersion of oxygen which allows one jet to cover a larger pond area compared to a paddle wheel system, while providing similar levels of oxygenation and mixing. This means that fewer units are required per pond, resulting in reduced operating and maintenance costs.

Preliminary analysis using the EnergyProof calculators suggests that by replacing the paddle wheels with jet aerators, Pacific Reef Fisheries could reduce the number of aerators per pond from 10 down to at least eight if not six. The energy savings achieved are in the order of \$100,000 to \$200,000 per year, in addition to labour savings from reduced maintenance and biofouling-related cleaning.

Next steps will involve Pacific Reef Fisheries finalising the trial to confirm the minimum number of jet aerators needed to perform as well as 10 paddle wheels per pond. Based on the outcomes of the trial, the site will be well placed to implement the technology change.





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Further reference on jet aeration and energy efficiency go to the Australian Prawn farming Association – currently conducting research on aerators www.apfa.com.au

4.2 Practice steps

Practice steps	Description
<p>1. Implement a regular planning process for energy and water efficiency initiatives</p>	<p>Develop an energy and water improvement plan as part of your regular budget cycle. This should consider energy supply, tariffs, motors and pumps, mobile plant / machinery, metering systems, operational procedures, controls and maintenance plans, and could also include homestead energy and water use.</p> <p>Seek input from staff, contractors, equipment suppliers and others as needed. The EnergyProof plan document can be used to ensure that identified actions are captured.</p>
<p>2. Identify and assess potential saving initiatives</p>	<p>Resources that are useful when looking to find ways to save energy, water and money include:</p> <ul style="list-style-type: none"> • Energy, fuel, water bills and consumption levels (e.g. from the Baseline tool), fertiliser use data, waste oil, • List of equipment that uses energy / water, • Operating data and maintenance records for pumps, machinery, etc, • Details of tariffs, rebates, agreements or allocations that apply for energy, water, fuel, and • Latest efficiency opportunities for your industry, including productivity that can impact on energy or water use <p>Drawing on this information and with input from others, identify and record a list of potential opportunities. These could be recorded in the Efficiency Opportunities Workbook. Costs and potential savings for these ideas should be evaluated by comparison with current equipment performance and supported with competitive quotes.</p>
<p>3. Implementation of efficiency opportunities, and measurement and verification of savings</p>	<p>Implementation can often be supported with assistance from Governments or other authorities. These may include grants, low interest loans, feed-in-tariffs, peak demand reduction incentives, rebates and energy efficiency credits. The potential for these to apply should be investigated with the relevant bodies.</p> <p>Implementation of projects should be tracked and savings measured by reference to new utility bills, metered data on-site (e.g. water use, solar energy for PV array), or other appropriate methods.</p>

4.3 Supporting tools and templates related to the practice steps

Tool or Template	This tool is useful if.....	Link
Energy and water improvement plan	You want to record all identified energy and water saving projects in a central place, and keep track of cost and savings calculations.	Efficiency Opportunities Workbook (Excel)
Baseline tool	You want to understand your current impacts such as energy use, carbon emissions and energy cost.	Baseline tool

4.4 Additional websites for reference / general knowledge

The following websites are recommended for background knowledge and further reference.

Website link	This website is useful because....
http://www.worldfishcenter.org/resource_centre/WF_2821.pdf http://www.dpi.vic.gov.au/fisheries/aquaculture/aquaculture-management/guidelines-for-recirculating-aquaculture-systems	Access to energy efficiency standards ,practices and challenges for the industry
Energy Excellence – Department of Resources Energy and Tourism:	It links to a wide range of best practice websites that have been independently evaluated. http://eex.gov.au/