

InnoVeg

Horticulture Australia Limited



BUSINESS CASE  
New Irrigator



Horticulture Australia

*"The Vegetable Industry Development Program is funded by HAL using the vegetable levy and matched funds from the Australian Government".*





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## Business Case

### NEW IRRIGATOR

## What is a business case?

*A business case is a formal process of planning to provide the decision-maker with useful information to help them make a decision. You will have greater confidence in your decision, if you use a formal process and make sure you count the right things the right way, whilst also considering the things that cannot be counted.*

### A new irrigator

A vegetable grower in south-east Queensland, recently considered changing their irrigation system with the addition of a new lateral move irrigator. It was important to evaluate the costs and benefits of the old lateral boom irrigators that were still functioning compared to the installation of a new (and additional) lateral move irrigator.

The grower produces numerous crops as part of crop rotations and normal market opportunities. These crops include broccoli, onions, sweet corn, pulse crops and grains.

The grower operates a number of different irrigators on the property including: lateral move irrigators, big gun irrigators and lateral move (100m) boom irrigators.

### What is the decision?

This specific decision relates to a 101ha (250 acres) parcel of land that is currently irrigated by two 100m lateral move boom irrigators. These existing irrigators are getting old, have high maintenance costs and in the peak of summer, can't quite keep up with the water requirement.

The decision for this grower is "to continue with the two existing lateral move boom irrigators" or alternatively "to purchase a new lateral move irrigator in addition to the existing lateral move boom irrigators".

### What do you have to count?

#### Depreciation

An investment in new machinery and equipment will increase the grower's **depreciation**. This is not a cash cost, but a critical allowance to make when calculating profit. If you do not account for depreciation, then you will not have any money available to replace the machinery when needed.

#### Cost of capital

An investment in a new irrigator also means that they will need to use spare cash or increase borrowings to pay for the machines, thus they need to consider the **cost of capital**. The cost of borrowed capital is obvious (i.e. the interest cost), but the cost of your own capital is less so.

Why should you value it any less? If you spend money on a new irrigator, then there will be other things you cannot do with that money, e.g. employ someone to do your marketing, pay less overdraft interest, improve mechanisation processes on farm. Thus, your own capital has a value too. It is known as its opportunity cost.

#### Operating costs (Maintenance & Labour)

Finally, the grower is comparing two different systems of irrigation, thus they will undoubtedly have different **operating costs**. They need to quantify the costs associated with each system for maintenance, water use and labour.

#### Productivity benefits

Why does the grower want to buy the new irrigators? If they are keen on expanding the business, or improving its profitability, then the answer must be that they expect to achieve some **productivity benefits**. In this particular example the productivity improvement is linked to the ability to apply more irrigation water in the peak of summer to grow more valuable and higher yielding crops.

## The scenario

*Here are the two scenarios that are considered comparing the current situation of the old existing boom irrigators with the addition of a new lateral move irrigator:*

What do you count?	Current Situation (Two existing linear boom irrigators)	Possible Future Situation (Addition of a new lateral move irrigator for 36ha)
Depreciation	<p>The current two machines are 20 years old and worth about \$55,000 each.</p> <p>They probably have 10 more years in them before they have a value of \$30,000 each.</p>	<p>The new irrigator will cost \$120,000 excluding GST.</p> <p>It is anticipated to be worth \$36,000 after 30 years.</p>
Cost of capital	With a bit of debt to repay, any spare cash is valued at 7.5%.	Capital is still worth 7.5%. This is the current rate for a Hire Purchase arrangement.
Operating costs	<p>The existing irrigator requires a new hose and new rope every 7 years at \$10,000, and \$1,500.</p> <p>The engine service cost is \$7/ML, fuel is \$39/ML and each irrigator is doing around 65 hours per ha working on 4.5ML/ha application. General parts are around \$1,000 per irrigator per annum.</p> <p>The labour costs are at 15 hours per unit per irrigation for 10 irrigations per season with labour costs at \$30/hour including workcover and super.</p>	<p>The new irrigator requires a new hose every 10 years at \$10,000.</p> <p>The engine service cost is \$7/ML, fuel is \$39/ML and the irrigator is doing around 65 hours per ha working on 4.4ML/ha application. General parts are around \$200 per annum.</p> <p>The labour costs are at 2.6 hours per unit per irrigation for 10 irrigations per season with labour costs at \$30/hour including workcover and super.</p>
Productivity benefits	Nil – current situation.	<p>A small water application efficiency is anticipated based on 0.1ML/ha at \$80/ML for the area irrigated by the new irrigator.</p> <p>It is anticipated that with 3 irrigators now covering the 100ha area that a boost in productivity can occur of 20% of the crop margin (income less additional harvest costs). The crop margin is calculated on an average crop rotation.</p>

## How do you calculate it?

The table below outlines the assumptions and calculations for the two scenarios.

The calculation demonstrates that the operating costs are similar between the old system and the proposed new system as the amount of water pumped over a year is very similar regardless of which irrigator is used. There is also a significant labour saving due to the ease of positioning the lateral move irrigator compared to the old

lateral boom irrigators. The main benefit is the additional productivity that can be achieved through correct timing of irrigations in summer when water requirements are critical.

At the end of the day, the grower is keen to purchase the new irrigator after thinking about the numbers and talking them through with his family and advisors. He expects to be able to increase his underlying profit by approximately \$33,000 per annum.

ASSUMPTION	OLD	NEW + OLD
<b>Capital Costs</b>		
Current value	\$110,000	\$120,000
Salvage value	\$60,000	\$36,000
Expected life (years)	10	30
Interest rate / opportunity cost	7.5%	7.5%
<b>Depreciation / irrigator</b>	<b>\$5,000</b>	<b>\$2,800</b>
<b>Opportunity cost / irrigator</b>	<b>\$8,250</b>	<b>\$9,000</b>
<b>Production Parameters</b>		
Area under irrigation (ha)	101	101
Old Irrigator (ha)	101	65
New Irrigator (ha)		36
ML/ha applied	4.5	4.4
Water cost (\$/ML)	80	80
<b>Maintenance Costs</b>		
Hose replacement	1,429	1,000
Rope replacement	214	0
General parts	1,000	200
<b>Maintenance cost / unit</b>	<b>\$2,643</b>	<b>\$1,200</b>
<b>Operating Costs</b>		
Engine Service (\$/ML)	7	7
Fuel (\$/ML)	39	39
Engine hours / annum / ha	65	65
Total water pumped (ML)	454.50	441
<b>Operating cost total</b>	<b>\$20,907</b>	<b>\$20,280</b>
<b>Labour Costs</b>		
Area (ha)	36	36
Hours per irrigation / unit	15	2.6
Irrigations / season	10	10
Staff costs (incl. on costs)	\$30	\$30
<b>Labour cost / unit</b>	<b>\$4,500</b>	<b>\$780</b>
<b>Labour cost / total</b>	<b>\$12,600</b>	<b>\$8,880</b>
<b>Productivity Benefits</b>		
Water Efficiency		\$1,901
Crop Margin (income less harvest costs)		\$2,000
Estimated lift in production		20%
Estimated area improvement		101
<b>Net Benefit</b>		<b>\$40,400</b>

CALCULATION	OLD	NEW + OLD
<b>Cost Calculations</b>		
Depreciation total	\$5,000	\$7,800
Opportunity cost total	\$8,250	\$17,250
Maintenance cost total	\$2,643	\$3,843
Operating cost total	\$20,907	\$20,280
Labour cost total	\$12,600	\$8,880
<b>Total Costs</b>	<b>\$49,400</b>	<b>\$58,053</b>
<b>Benefit Calculations</b>		
Water savings		\$1,091
Increased production (less harvest costs)		\$40,400
<b>Total Benefits</b>		<b>\$41,491</b>
<b>Total Relative Cost</b>	<b>\$49,400</b>	<b>\$16,562</b>
<b>Is it more profitable?</b>		
		<b>YES</b>
<b>by how much?</b>		<b>\$32,838</b>

*continued* | How do you calculate it?

The other question for the grower, is that if a 4 year hire purchase agreement is taken out for the new irrigator, then what would the cashflow impact be to the business?

The calculation of cash impact (below) shows that with

the anticipated 20% productivity increase the purchase under a hire purchase agreement is also cash flow positive provided that the payments for the new irrigators can be made to line up with the crop income.

#### CASH IMPACT

Hire Purchase payments/annum	-\$34,818
Additional Maintenance costs	-\$1,200
Labour Savings	\$3,720
Water Savings	\$1,091
Productivity Benefit	\$40,400
<b>Cash Surplus/Deficit</b>	<b>\$9,193</b>

One further question raised, is how sensitive is the result to productivity enhancements? The table below describes the impact to profit when both the crop margin (total income per hectare less harvesting costs) and productivity benefits

(yield and quality improvements) are changed. The sensitivity analysis shows that a minimum 5% increase in productivity is required, which the grower is confident can be achieved.

#### SENSITIVITY ANALYSIS - PROFIT

	\$1,800	\$2,000	\$2,200
1%	-\$5,744	-\$5,542	-\$5,340
5%	\$1,528	\$2,538	\$3,548
10%	\$10,618	\$12,638	\$14,658
15%	\$19,708	\$22,738	\$25,768
20%	\$28,798	\$32,838	\$36,878
25%	\$37,888	\$42,938	\$47,988

The impact to cashflow in the initial 4 year period when Principal and Interest payments are being made on the new irrigator is described in the table below. In the original calculation (page 4) the capital costs are spread over the life

of the machines (10 or 30 years) where as in this cashflow sensitivity analysis the capital is loaded up into the first four years demonstrating that a productivity enhancement of at least 15% is required for the purchase to be cash flow neutral.

#### SENSITIVITY ANALYSIS - CASH (INITIAL YEARS)

	\$1,800	\$2,000	\$2,200
1%	-\$29,389	-\$29,187	-\$28,985
5%	-\$22,117	-\$21,107	-\$20,097
10%	-\$13,027	-\$11,007	-\$8,987
15%	-\$3,937	-\$907	\$2,123
20%	\$5,153	\$9,193	\$13,233
25%	\$14,243	\$19,293	\$24,343

The benefits of the new irrigator are ultimately dependent on ongoing success of the business, and in particular the margins available from the crops that are grown. These

crops are subject to offtake agreements so the grower will need some confidence in their ability to maintain both the offtake agreements and margins available through the existing crop rotations.

## What else is important?

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### *Unmeasurable benefits and costs*

Every decision involves change (benefits and costs) in your business that can be measured and those that cannot be measured. The calculations presented demonstrate how to count the things that can be counted, but it is also important to consider those things that cannot be calculated.

When the calculation shows a clear benefit, like in this business case, it is a “no brainer”! Similarly, if there were a clear cost disadvantage from making the change, it would be obvious. However, it may well be the unmeasurable benefits and costs that swing your decision when the calculation is a “close thing”, e.g. in the scenario where the grower achieves a saving in labour (and frustration) but receives little benefit from the enhanced productivity.

### *Yield and Quality*

The impact of enhanced water application in summer and periods of drought will be critical to the decision. It can be in these seasons that there is a premium in the marketplace; alternatively in wet seasons there may be little benefit at all available from the enhanced irrigation capacity. You need to beware of gaining productivity benefits, only to see reduced price in the marketplace because of season variability.

### *Labour Improvements*

The existing workload of moving irrigators results in a significant time impediment to the business, especially in summer and during harvesting operations. Some relief on the amount of work required in moving irrigators will also provide benefits to the management team in the business.

### *Profit and Cashflow*

The two critical items to consider are both the profit and cashflow aspects of this capital purchase. The cashflow comes under pressure as the Hire Purchase (capital) payments are loaded up into the initial 4 years of the life of the machine, rather than being spread over the full life of the machine as is the case with the profit analysis presented in this document.

Where the cashflow comes under pressure, for example in the first years if productivity is only at 5%, then additional cash will be required to meet the repayments on the irrigator. A situation can arise where the new irrigator is profitable yet there is insufficient cash available to service the Hire Purchase repayments in the period when the irrigator is being repaid.





## Appendix – Detailed calculation

ASSUMPTION	OLD	NEW + OLD	CALCULATION	OLD	NEW + OLD
<b>Capital Costs</b>			<b>Operating Costs</b>		
Current value	\$110,000	\$120,000	Engine service (\$/ML)	\$7	\$7
Salvage value	\$60,000	\$36,000	Plus fuel (\$/ML)	\$39	\$39
Expected life (years)	10	30	Equals total cost (\$/ML)	\$46	\$46
Interest rate / opportunity cost	7.5%	7.5%	Multiplied by ML pumped / annum	455	441
<b>Production Parameters</b>			<b>Equals total operating cost</b>	<b>\$20,907</b>	<b>\$20,280</b>
Area under irrigation (ha)	101	101	<b>Labour Costs</b>		
Old Irrigator (ha)	101	65	Area irrigated (ha)	36	36
New Irrigator (ha)		36	Hours per irrigation / unit	15	2.6
ML/ha applied	4.5	4.4	Multiplied by Irrigations / season	10	10
Water cost (\$/ML)	\$80	\$80	Multiplied by staff costs (\$/hr)	\$30	\$30
<b>Maintenance &amp; Operations Costs</b>			<b>Equals total labour cost per area</b>	<b>\$4,500</b>	<b>\$780</b>
Hose replacement cost	\$10,000	\$10,000	Total irrigated area	101	101
Hose life (years)	7	10	Divided by area irrigated	36	36
Rope replacement cost	\$1,500	N/A	Equals number of shifts	2.8	2.8
Rope life (years)	7	N/A	Shifts with old irrigator	2.8	1.8
Engine Service (\$/ML)	\$7	\$7	Shifts with new irrigator	0	1
Fuel (\$/ML)	\$39	\$39	Shifts with old irrigator x labour cost	\$12,600	\$8,100
Engine hours / annum / ha	65	65	Shifts with new irrigator x labour cost	0	0
ML pumped / annum	455	441	<b>Equals total labour cost</b>	<b>\$12,600</b>	<b>\$8,880</b>
General parts / annum	\$1,000	\$200	<b>Productivity Benefits</b>		
<b>Labour Costs</b>			Average water applied old system		455
Area (ha)	36	36	Less average water applied new irrigator		441
Hours per irrigation / unit	15	2.6	Equals water saving		14
Irrigations / season	10	10	Multiplied by cost of water		\$80
Staff costs (incl. on costs)	\$30	\$30	<b>Equals value of water saved</b>		<b>\$1,091</b>
<b>Productivity Benefits</b>			Crop gross revenue (\$/ha)		2700
Crop Margin (income less harvest costs)		\$2,000	Less harvest costs (\$/ha)		700
Estimated lift in production		20%	Equals crop margin (\$/ha)		2000
Estimated area improvement		101	Multiplied by lift in production		20%
<b>CALCULATION</b>			Multiplied by total area		101
<b>Depreciation</b>			<b>Equals increased production</b>		<b>\$40,400</b>
Current value	\$110,000	\$120,000	<b>Total Cost</b>		
Less salvage value	\$60,000	\$36,000	Depreciation cost old unit	\$5,000	\$5,000
Equals amount to depreciate	\$50,000	\$84,000	Depreciation cost new unit		\$2,800
Divided by expected life	10	30	Plus opportunity cost	\$8,250	\$8,250
<b>Equals Depreciation costs</b>	<b>\$5,000</b>	<b>\$2,800</b>	Plus opportunity cost new unit		\$9,000
<b>Interest / opportunity cost</b>			Plus maintenance costs	\$2,643	\$2,643
Current value	\$110,000	\$120,000	Plus maintenance costs new unit		1,200
Multiplied by interest rate	7.5%	7.5%	Plus operating costs	\$20,907	\$20,280
<b>Equals interest / opportunity cost</b>	<b>\$8,250</b>	<b>\$9,000</b>	Plus labour costs	\$12,600	\$8,880
<b>Maintenance Costs</b>			Minus water savings		-\$1,091
Hose replacement cost	\$10,000	\$10,000	Minus additional productivity		-\$40,400
Divided by hose life (years)	7	10	<b>Total Cost</b>	<b>\$49,400</b>	<b>\$16,562</b>
<b>Equals annual hose cost</b>	<b>\$1,429</b>	<b>\$1,000</b>	<b>Is it more profitable?</b>		
Rope replacement cost	\$1,500	n/a	<b>YES</b>		
Rope life (years)	7	n/a	<b>by how much?</b>		
<b>Equals annual rope cost</b>	<b>\$214</b>	<b>\$0</b>	Total cost of old machines		\$49,400
General parts / annum	\$1,000	\$200	Less total cost of new machines		\$16,562
Annual hose cost	\$1,429	\$1,000	<b>Equals by how much?</b>		<b>\$32,838</b>
Plus annual rope cost	\$214	\$0			
Plus general parts cost	\$1,000	\$200			
<b>Equals maintenance cost</b>	<b>\$2,643</b>	<b>\$1,200</b>			







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#### *Disclaimer*

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