Solar on Farms

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What do you pay for power?

Electric Farms

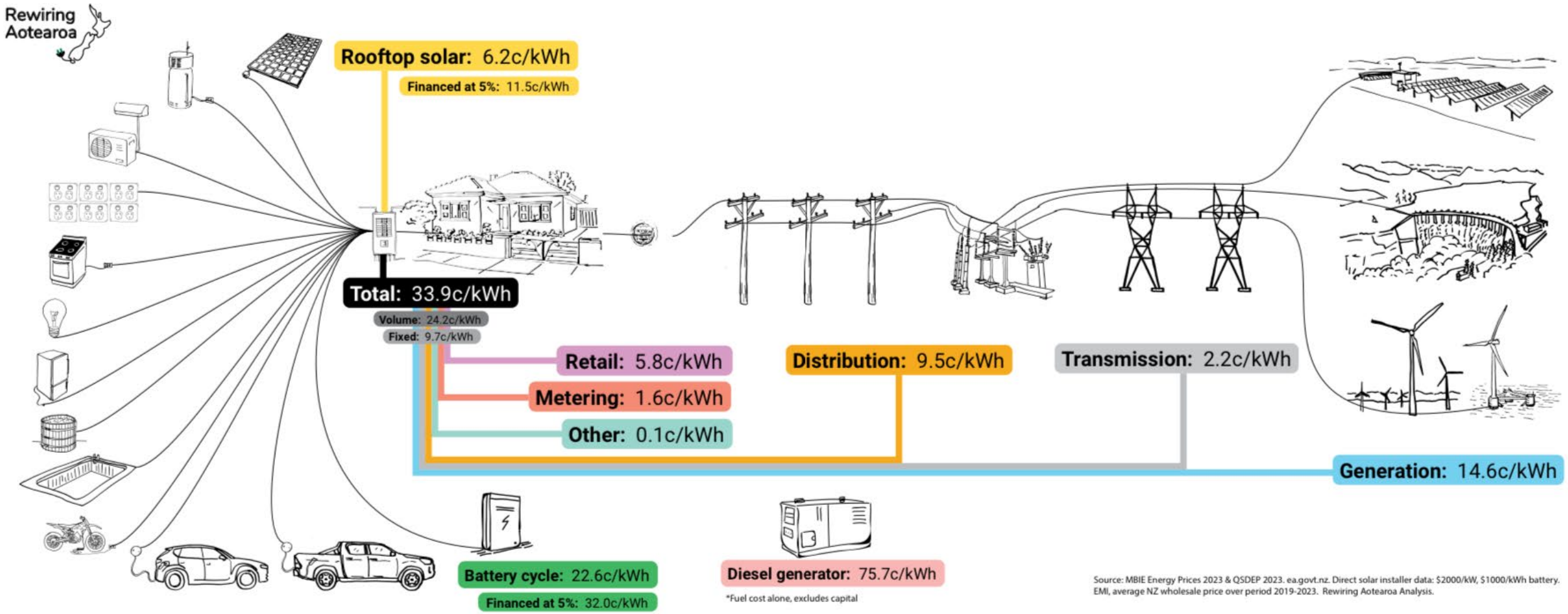

Figure 1. Delivered electricity costs breakdown for grid electricity, rooftop solar, battery cycles and diesel generators.

The low-hanging fruit

What is your biggest power draw on farm?

For us it was this 30kW fixed-speed pump that runs our K-line irrigation from November-April 24/7
This was costing us $28,000/annum to run.

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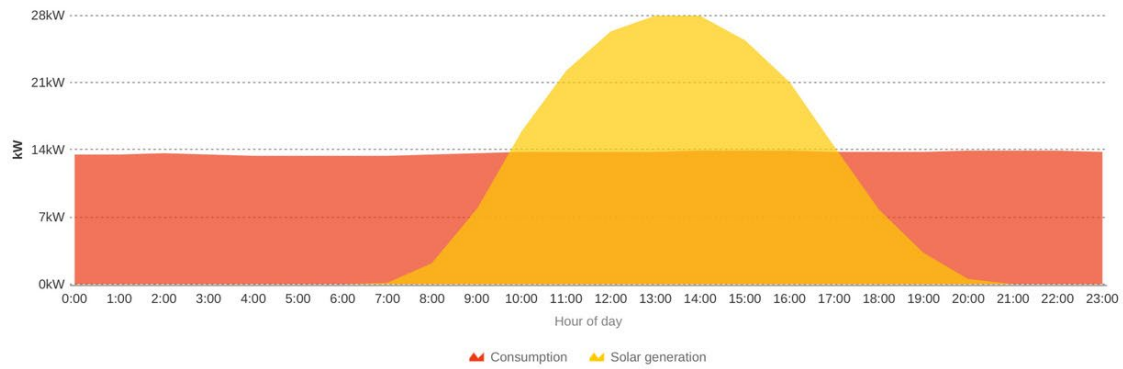
Average Daily Energy Profile

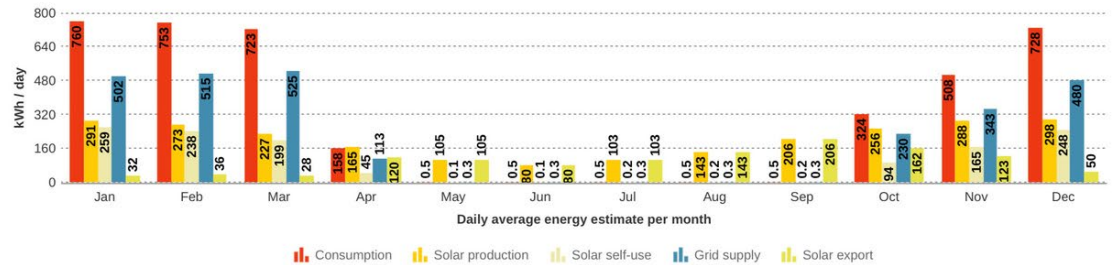
We can view the energy flows on an average day to see how solar generation in yellow meets loads or is exported to the grid.



Inverter warranty	10 years
Module warranty	99.0% - Year 1 power warranty, 87.4% - 30 Years Performance Warranty

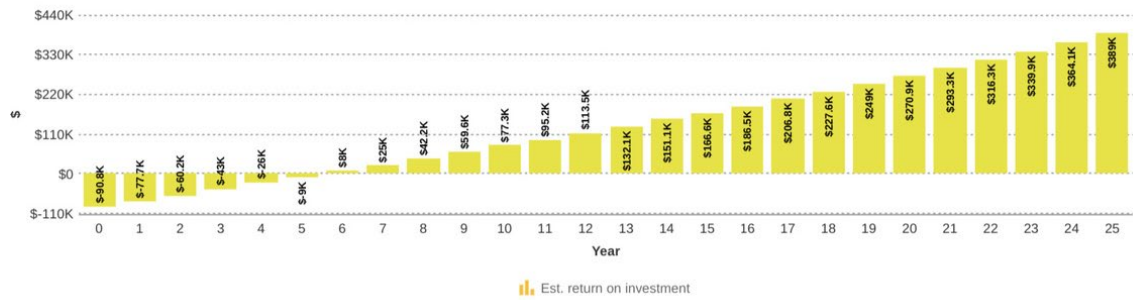
Daily Solar Production per Month

This chart shows the average solar production potential per day for each month. In other charts you will see indications of the amount of solar you consume, export to the grid, and possibly an unused proportion.



System Lifetime Savings and Return of Investment

In this chart we see the initial investment followed by the return on your investment with accumulated savings over the lifetime of the system.

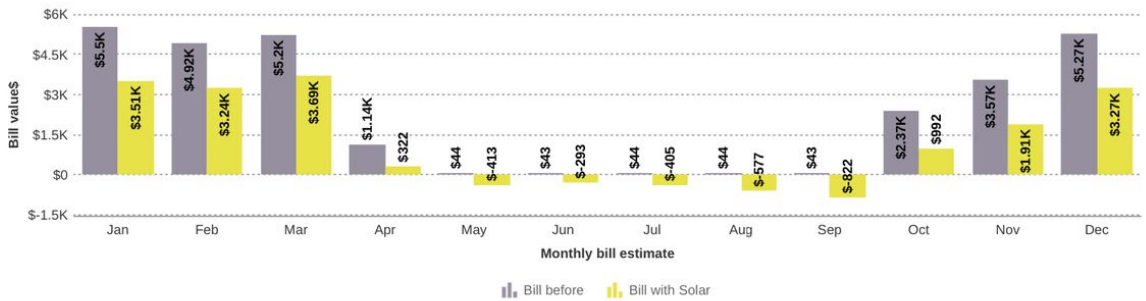


Net present value:	Internal rate of return:	Net cost of solar power:	Carbon emission savings :
$135,822	18.37 %	$0.06 /kWh	9.2 tonnes CO_2

First Year Savings Simulation

Monthly Savings

This is a comparison of estimated monthly bill totals before your solar installation, compared with the simulated total after the system is operating.



Savings	Electricity Charges	Energy charges: 23.18c/kWh; Export credit: 14c /kWh; Daily supply charges: 131.86c;
$13,819 *for the first year*	Key Assumptions	Electricity tariff escalation rate: 3% p.a., Panel avg. shade derating 2%, Panel dirt and dust derating factor: 98%, Panel efficiency loss in year 2: 1.00%; Degradation loss in subsequent years: 0.40%; System lifecycle years 25 yrs;
Payback time		
5 yrs 6 mths		

High Level Financials

- Total Investment <$100,000
- Annual Cost of power before $28,000
- Annual Cost of Power after $19,000 ($9K savings)
- Annual Income from Power $5,000
- Net Cost of Power after $14,000
- Return on Investment over lifetime of project 18.5%
- Payback period <6 years
- Cost of generated power to the farm 0.06c

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The Solution

- Existing transformer at site is 50kVa

so….

- 54.54kW solar array with 50kW inverter
- Grid connected system with no battery
- Low voltage system
- 2 x arrays 32m long x 3.6m wide (108 panels)
- Array height is 3.5m at back and 1.7m at front.
- Construction took less than 3 weeks (construction team and electrician)

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So what does Install look like?

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Site

- Marked out with standards and drop measured

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Trenching

- 600+mm deep trench
  from pump shed to centre
  first row of tables

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Post holes

- 250mm auger
- Augered to 800mm, but we hit water!

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Driving posts

- SO we got a bigger digger…
- Vibro head drove the posts the additional 400mm depth to 1200mm.

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More trenching

- Another trench between rows.

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Concrete

- 1.5 cubic metres of concrete spread across 24 holes.
- We used a concrete truck due to proximity to Ranfurly

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Construction

- Time to put it all together…

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Construction

- String lines and laser levels in action as they key part here as getting everything as square as possible.

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Panels on

- 108 Canadian Solar 505W panels
- 1994mmx1134mm 25kg each
- Arrange in tables of 18.
- This system is 6 tables in 2 rows

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Getting there

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Time for the Sparky

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Tidy job

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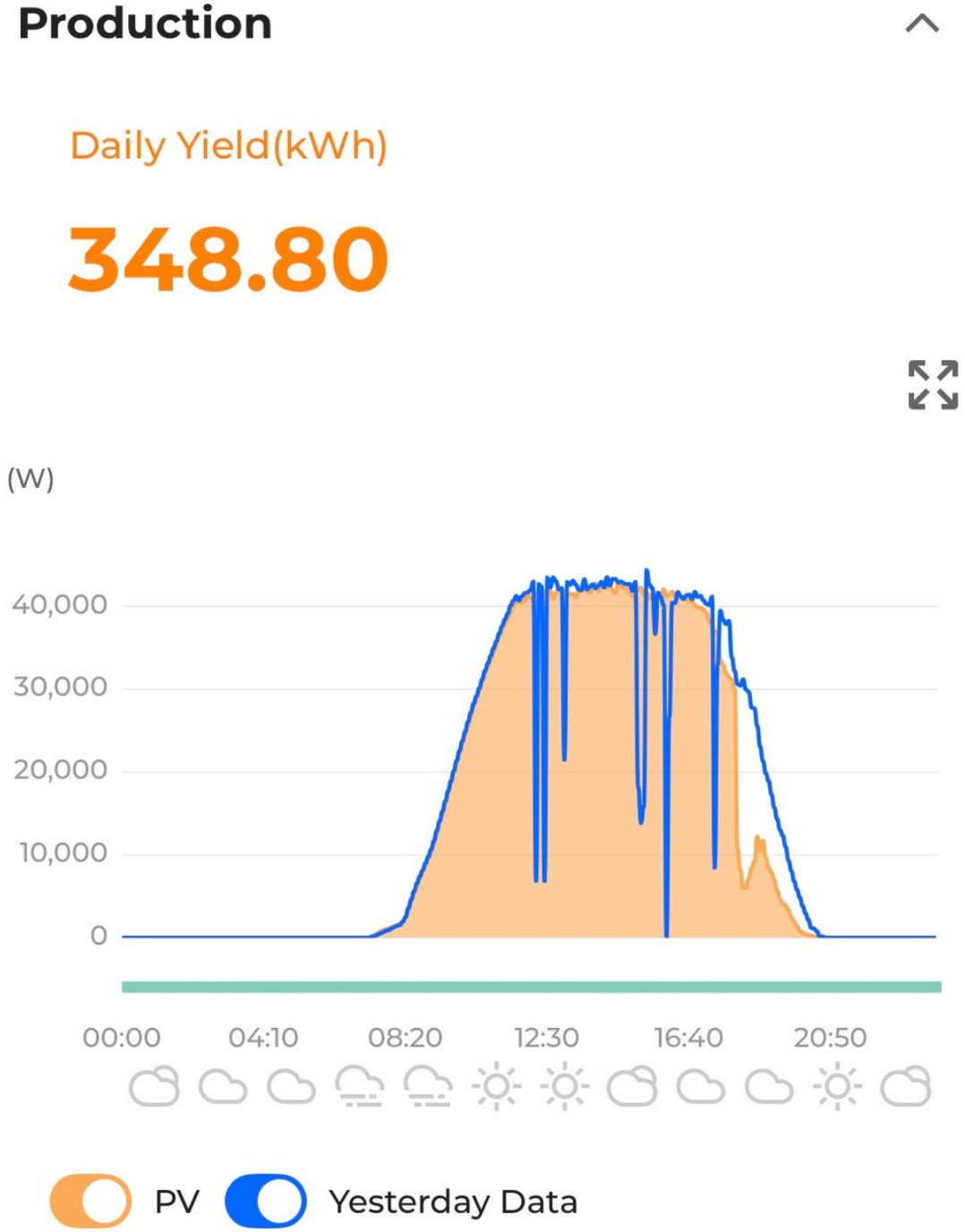

What production looks like?

- Late Summer consistently producing over 300kWh a day
- Often running the irrigation pump solely off solar from 10am - 4pm and exporting surplus back to the grid
- Seamless switching from grid to off-grid
- Even if pump turned off 300kWh x 0.08c profit on export = $24/day

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Examples of other systems

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The cheapest energy a farmer can purchase is that which they generate and consume themselves.

How can we use more self-generated energy on farm?

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Take Home Messages

1. Purchasing energy is expensive (and only rising!)
2. You have the ability to generate electrical energy yourself
3. You can then prioritise electricity as your main source of electricity (replacing fossil fuels)
4. If you have surplus electrical energy leftover, someone will pay you for it with at least a 50% profit margin.

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