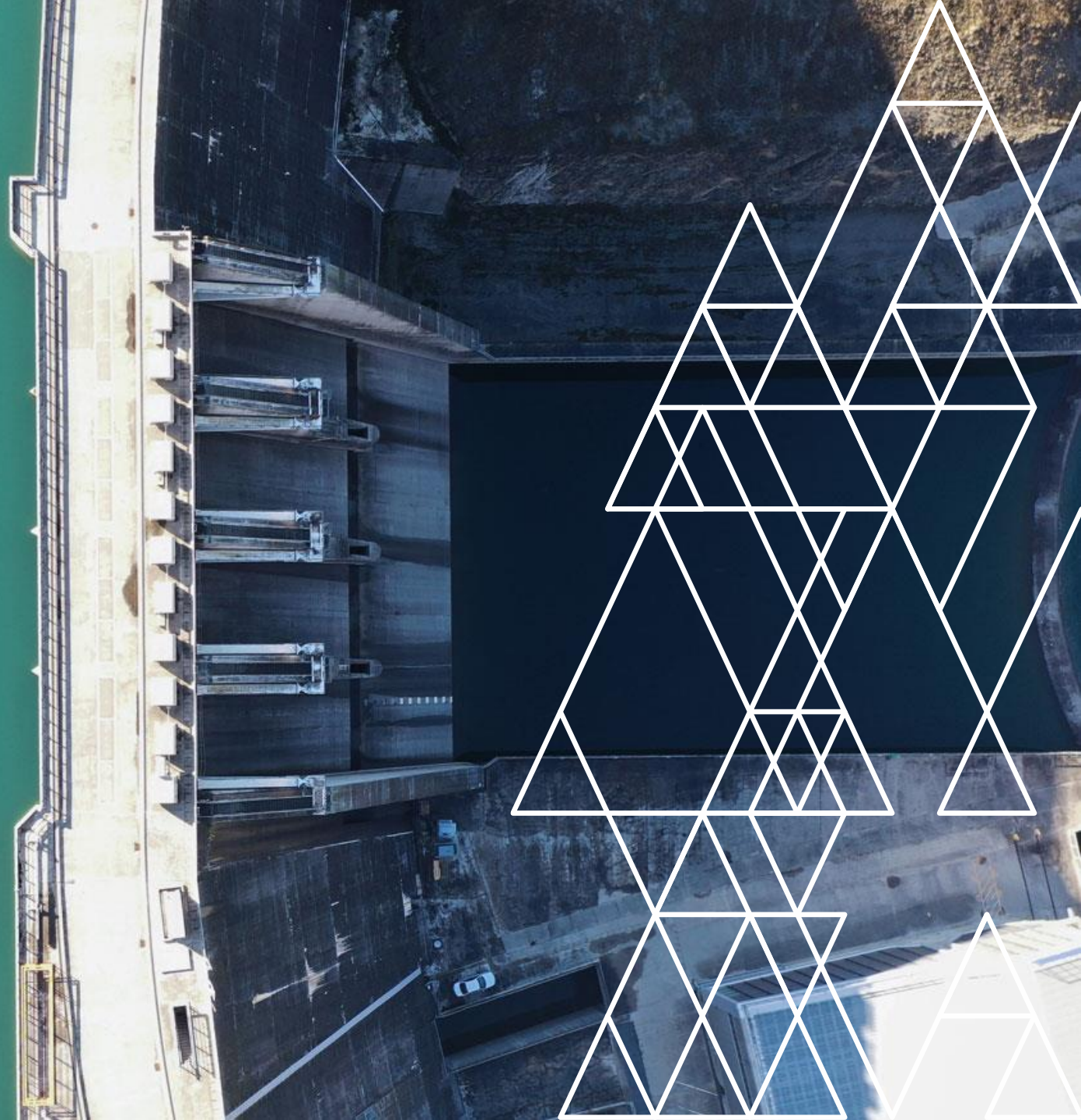
# Renewable Energy Opportunities on Farm

Save energy on farm; it just makes sense

Insa Errey 2nd May 2024

EECA
TE TARI TIAKI PŪNGAO
ENERGY EFFICIENCY & CONSERVATION AUTHORITY



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The TCC is farmer-led,  farmer-driven, and exists to support and empower farmers to ensure the long-term sustainability of their businesses and communities.

# Today's topics

- Energy efficiency – A simple three step formula
- The future today – On Farm Solar
- Exploration into biogas technology
- Set your goals

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**#2316 544**

# What are you interested in hearing about most today?

[Renewable Energy Opportunities on Farm (sli.do)]

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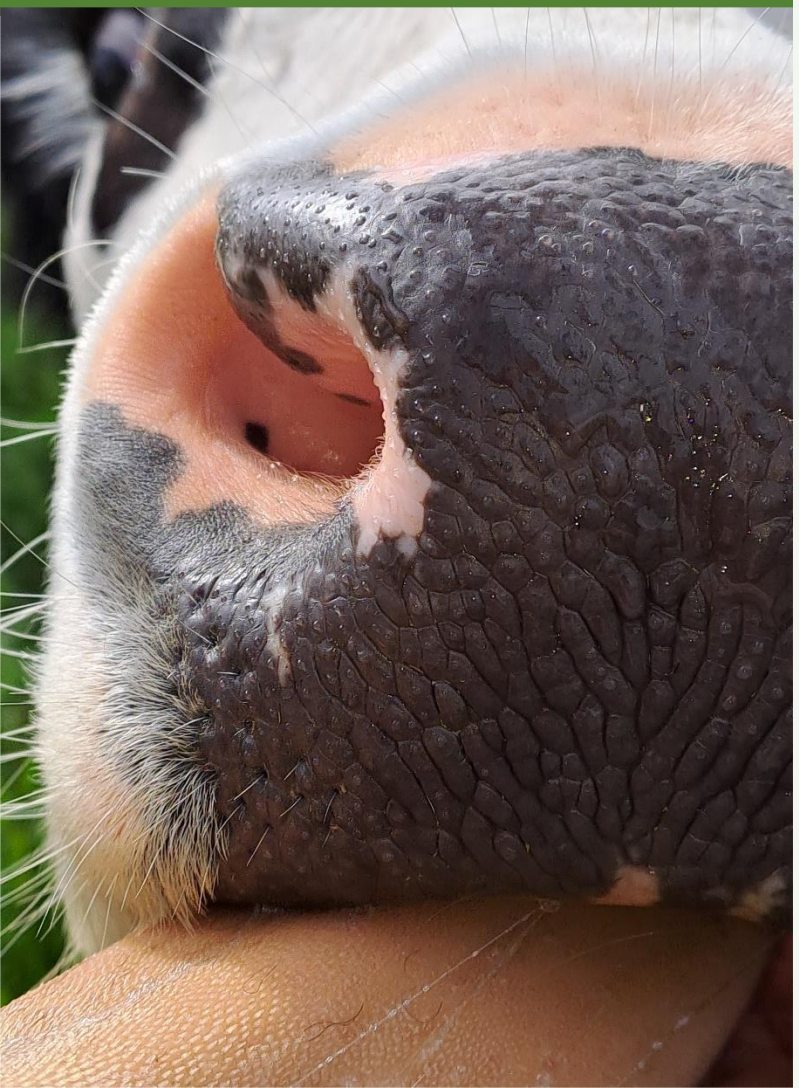
# The best farms use 1/5th of the electricity

of the highest users per KgMS

# Next Moove



# 3 steps

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### Quick hits

things we can do now

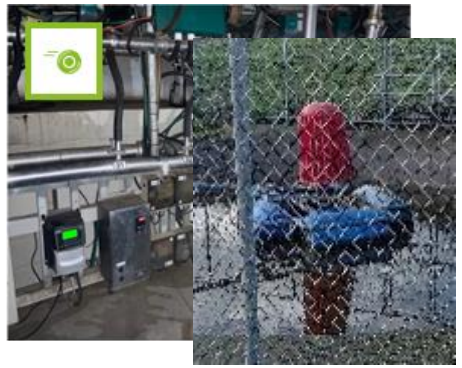
### Long term plan

get in the farm plan for replacement and renewals

### Operating efficiency

what the team does day to day

# Quick Hits – Top 5

| Vats, cylinder, pipe | LED lights | Day/ night rates (or other timing) | Pumps | Solar Panels |
|---|---|---|---|---|
|  |  |  |  |  |
| Insulate/ wrap | Better lighting | Add timers on<br>Hot water<br>Cylinders<br>Ice Banks<br>Effluent/ irrigation Pumps | Variable Speed Drives (VSDs)<br>Digital Controllers (F60s)<br>Better Flow<br>Protecting Equipment | Size to save<br>Design for resilience<br>Timers/ smarts to shift loads |
| Payback years | | | | |
| 3-6 VAT<br>short HW | 5 | 1 | 2-6 | 5-12 |

# Quick Hits

- Speak to your current supplier
- Not happy with them, ask your neighbours/ network
- TCC has a specific solar 2 pager as it's a little new

**Insulate VATs**
- Fonterra can advise you on your VAT type/ size

**Wrap hot water cylinder, lag pipes and fix leaks**
- For cylinder wraps call your plumber (can also self wrap)
- Pipe lagging must suit temperature and pipe diameter

**Install variable speed drives and pump controllers (e.g.F60s)**
- Call your pump supplier
- Check all pumps (see our advice)

**Install LED lighting**
- Call your electrician

**Install timers**
- Call your electrician

**Install solar panels (PV)**
- User timers/smarts
- PV has pay-as-you-generate (Power Purchase Agreement or PPA) and other finance options
- See the solar panels guide for more on what to ask, look for and consider

# Long Term Plan - Top 5

## Hot water heat pumps


Primarily new builds or LPG conversions

Payback years

11

## Heat recovery


Pre-heat how water for cleansing from waste heat (chilling, dumped wash water)

4-5

## Snap Chilling


30% cooling efficiency plus heat recovery

Reduce GHG

Pay As You Save option

Vari-able

## Yard Washdown

Water and effluent savings (high water systems)

Scraper gate

Short

## Precision Irrigation

Energy savings a by product when investing

Short

# Long Term Plan

## Plan now for renewals

**Estimate renewal date**

**Update your Farm Plan**

**Talk to supplier(s) well in advance**

**Hot water heat pump to replace cylinder**
- On cylinder renewal
- Heat pump most beneficial for new shed

**Install heat recovery**
- On chiller renewal

**Install snap chiller**
- On chiller renewal
- Check FarmSource partners
- Coolsense offer Pay As You Save and reduced greenhouse gas from refrigerants

**Yard Washdown**
- Water use, water cycle, scraping gates
- Timing depends on opportunity/ related investment

**Precision irrigation**
- If you use significant irrigation and assessing for other reasons, consider energy savings

# Operating efficiency

## Top energy saving operational choices

### Dairy Shed

- Plant renewal plans
- Plant service schedules
- Set point temperatures
- Switch off unused plant

### Diesel & time

- Feeding practices
- Frequency, choice & care of vehicle
- Using contractors
- Herd wearables

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# Rank the order of what you think will have the most impact on your farm?

**Quick hits**

**Long term plan**

**Operating efficiency**

Renewable Energy Opportunities on Farm (sli.do)

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# VIDEO TWO ENERGY EFFICIENCY

- Farm strategy and approach
- VSDs (Varivac)
- Flow controllers (F60s)
- Snap chiller (heat recovery to 65C!)
- Positive displacement pump, PVC pipe, bacteria

Niaruo. Farms (youtube.com)

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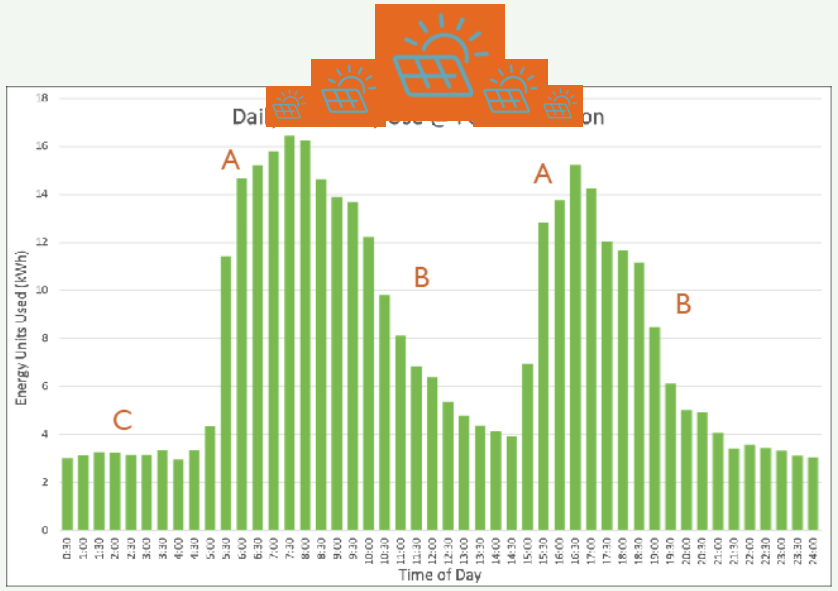
# The future's arriving fast

- On-farm solar stacks up
- Farm electricity use will grow
  - Electrify transport and machinery
- Electricity prices could be cheaper during sunny days
  - With more intermittent wind and solar generation

Increasingly we want to think smart about when and how we use energy

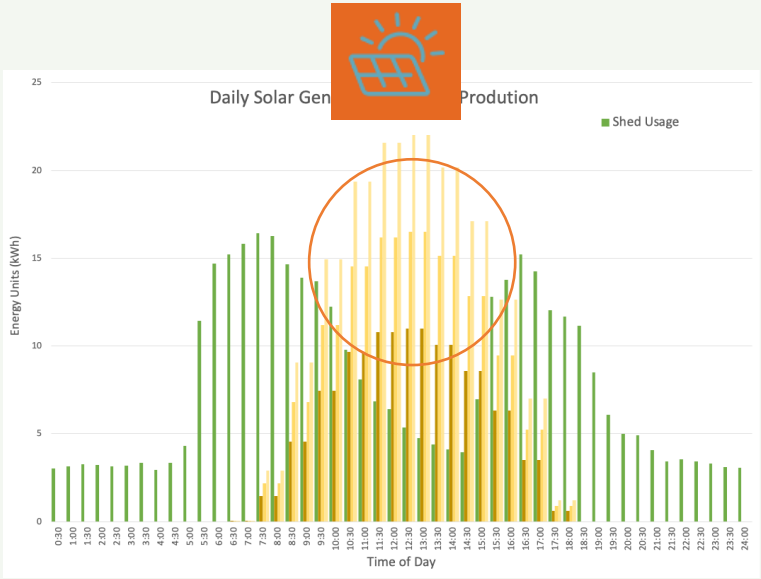
- **Design and Size PV for your farm's energy use**
- **Plan to use more energy when the sun shines**
- **Research your self help (DIY) options**
- **Consider your growth and resilience needs**

We get the most sun in the middle of the day




But most energy peaks morning and afternoon

So design to your needs (size, panel direction) and rethink when we use power




Or sell to the grid cheap and buy back high later!

# Design & DIY thinking

North facing

Maximises total generation and in middle of the day

East/ West facing

More balanced generation through the day

# So how do I use more energy when the sun shines? Think night rates

Using timers/ smarts

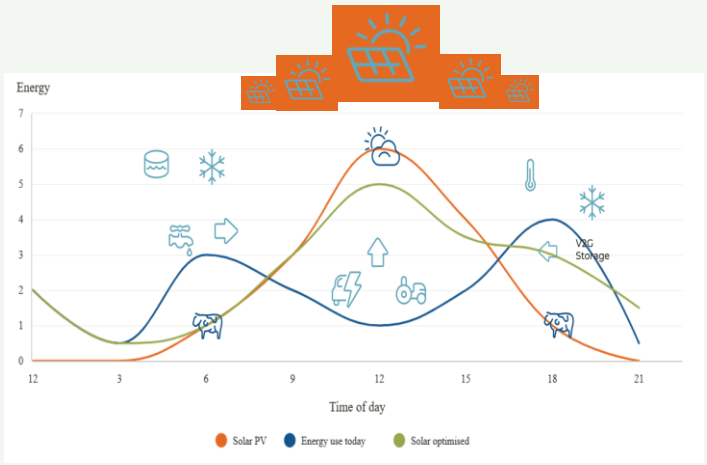
Schedule loads across the day

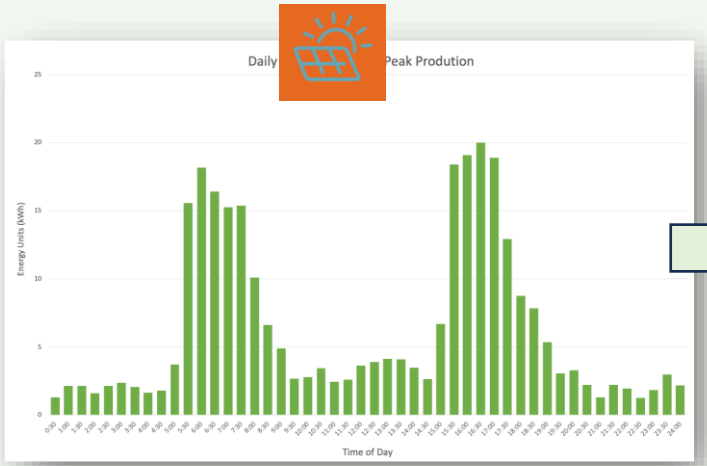
Build in storage capacity

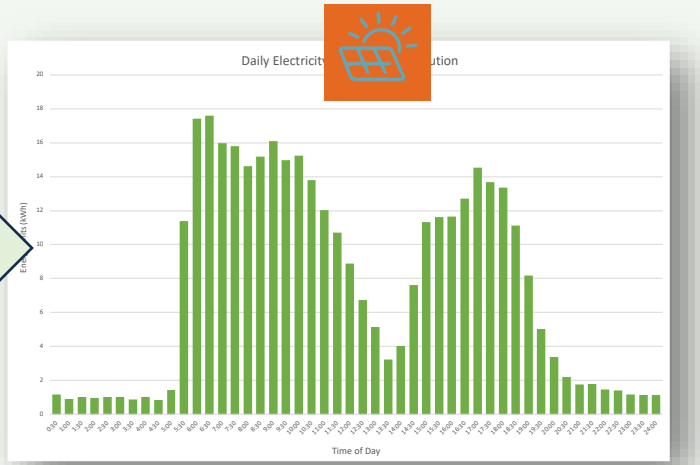
Hot water, ice banks, chillers

Sizing new equipment

To run long, low and slow



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# Solar Video

| Herd size/ system | Size kWp | Cost $000s | Savings life $000s | Payback Year |
|---|---|---|---|---|
| 200/ 3.5 lower energy use | 20 | $50 | $5.3 | 9 |
| 400/ 3.5 typical energy use | 40 | $100 | $10.7 | 9 |
| 300/ 2.5 high pump/ irrigation | 80 | $200 | $16.9 | 11 |
| 600/ 3 higher energy use | 80 | $200 | $36.8 | 5 |

30 year

[Luscombe EECA (youtube.com)]

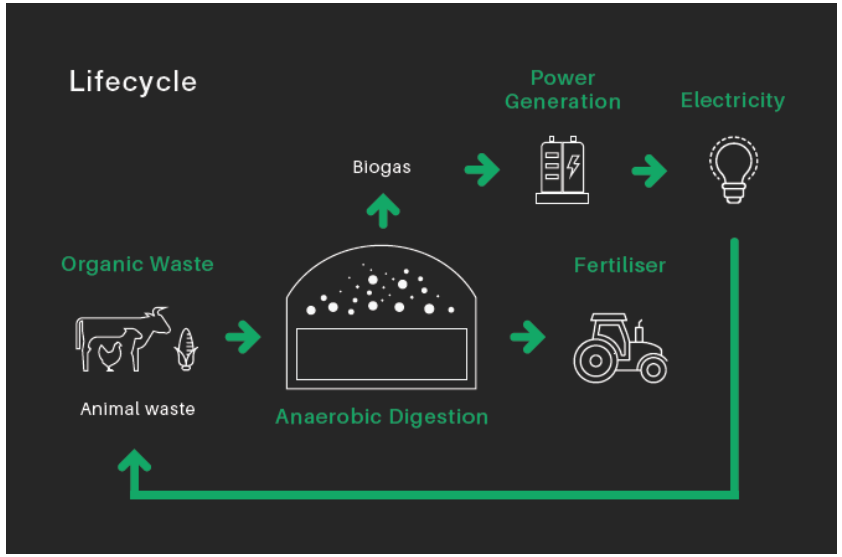
# Exploration into Biogas technology

- On-farm biogas projects are old news
- New innovations within small scale digesters
- Address a waste and energy problem

Increasingly we want to think smart about when and how we use energy

# What is biogas?

Waste such as animal manure, wastewater biosolids, and food wastes are fed into the tanks or ponds and bacteria breaks down the organic matter and biogas is produced..




# What can the biogas be used for?

- Direct fire into a boiler
- Converted into electricity (benefits of heat recovery)

# Tank Design –

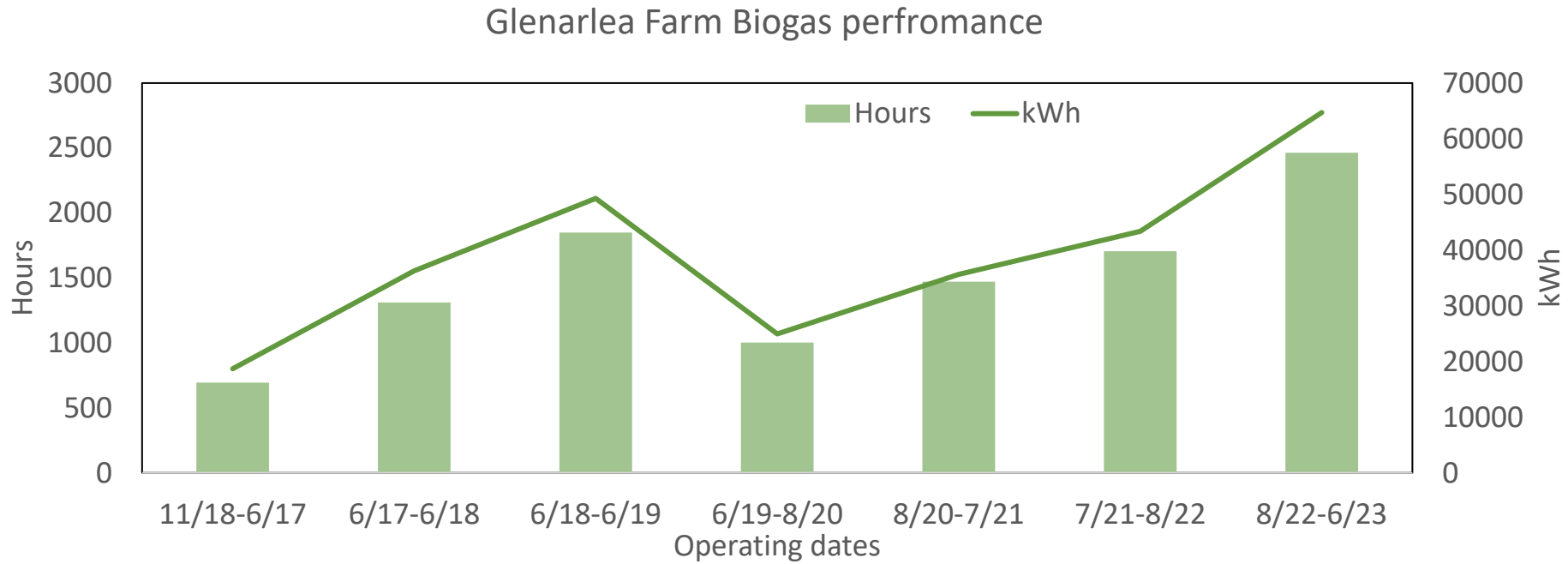
The airtight tank prevents oxygen from entering and the process of anaerobic (without air)digestion commences

# Extras

Nutrient-rich digestate which can be applied to land as a solid or liquid fertiliser; or combined with other raw materials to produce compost.

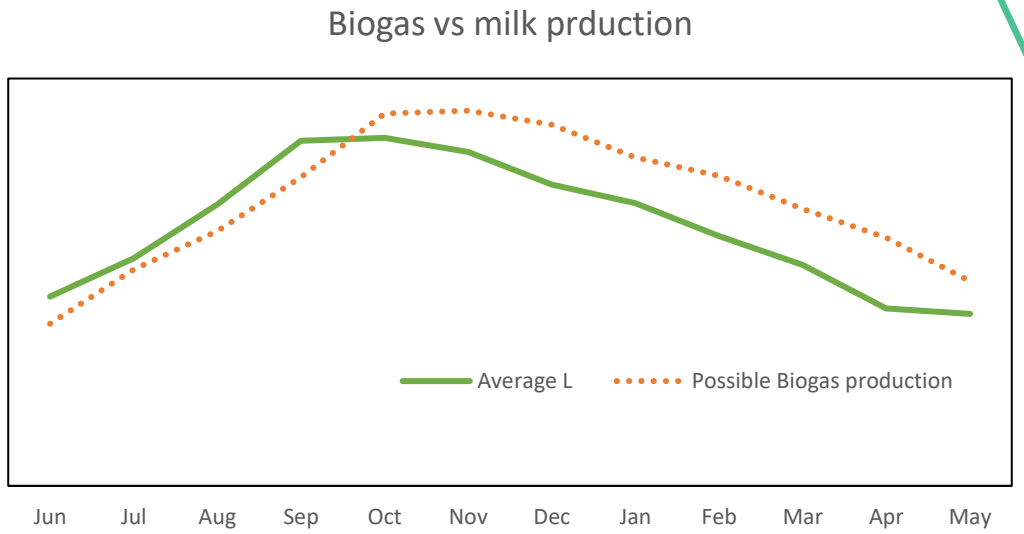
# Exploration into advancements in technology

- Best results for Winter feed lots opposed to standard grass grazing.




To get value:-

- Explore if you have adequate and easy assessable ‘waste’ to fed into digester or pond
- Gas production follows milk production with lag
- Consider how you could use the biogas
- Biological system needs advice to ensure success



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# What are your key takeaways?

## Our Actions

**Write your areas to act here**

[Renewable Energy Opportunities on Farm (sli.do)]

# Where now

**Your action cards** for when you get back

**At a glance guides** for

Farm self help

Advisors to prompt conversations

# Where next

**Advisors walkthrough and action plan**

Trial a toolkit for a non energy expert farm advisor, agribusiness manager or self help to walk through, identify and agree key actions

Farmers can act on the quick, line up their plans and know when to check in with suppliers or get an expert