INTEGRATING SOLAR ELECTRICITY GENERATION WITH LIVESTOCK FARMING IN CANTERBURY

Our Land and Water Rural Professionals Project 2022-23

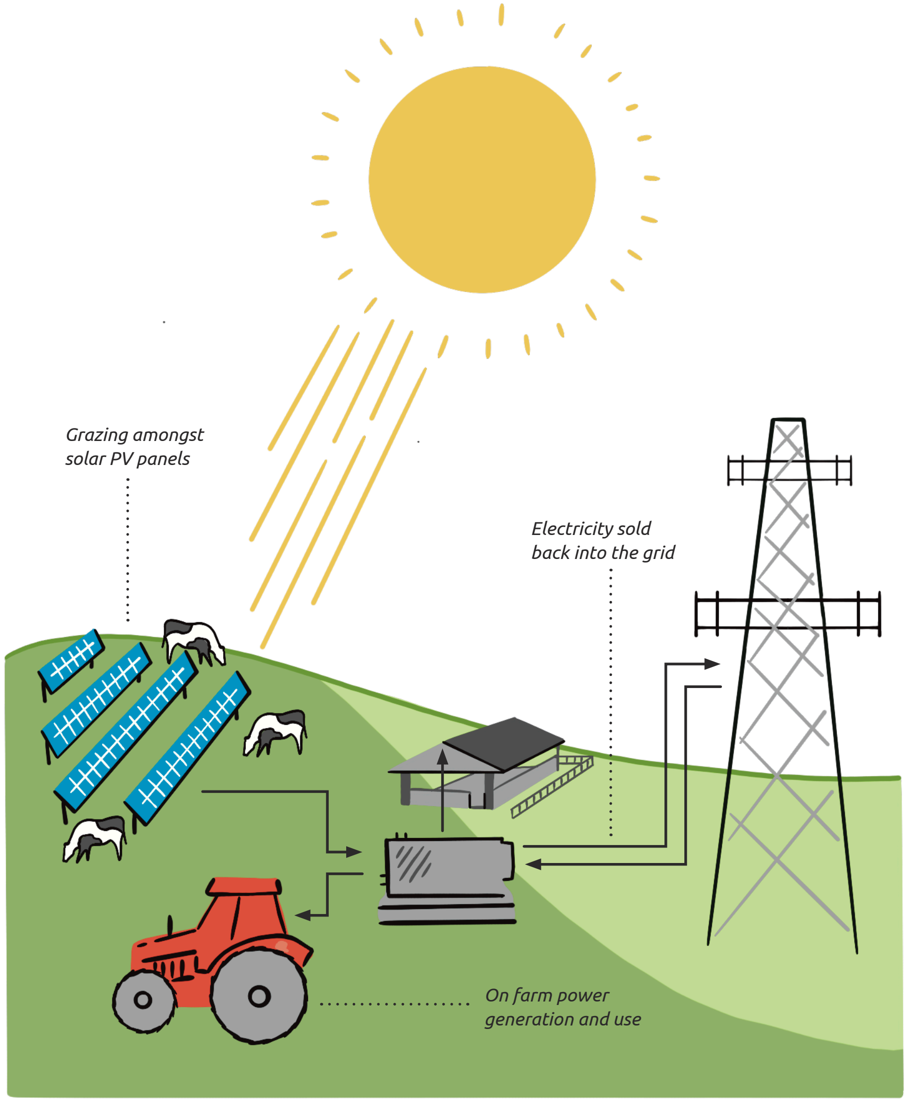
OPPORTUNITY

Aotearoa New Zealand has committed to actions to mitigate climate change. By 2050 the intention is to be transitioned to a net zero carbon economy. This means that emissions will be reduced as close to zero as possible, while investing in off-setting for the remaining emissions. The transition will require the uptake of more renewable energy technologies, such as utility-scale solar photovoltaic (PV) systems. The latter presents an opportunity for us, the farming community, to be a key enabler. We can use our land resources more effectively by continuing with our normal farming operations while generating renewable energy at scale. This dual land-use approach means we play our part to transition to a net zero carbon economy, but we also benefit by improving our resiliency – by being more self-reliant in terms of energy, and realising additional revenue streams. To this end this booklet focuses on agrivoltaics for livestock farming, specifically in the Canterbury region.

Contents

1.0 What is agrivoltaics?

Agrivoltaics is a concept that is gaining much traction in the global farming community. The intent is for us to find an optimal balance between using our land for both farming and solar electricity generation. Depending on the technology configuration, we can install agrivoltaic systems that allow livestock to graze between and/or under the solar PV panels. The generated electricity can of course be for on-farm use, but with larger systems we can sell electricity back to the national grid. Our goal with agrivoltaics is therefore to create synergies that increase land productivity by maintaining food production potential, while still generating a viable amount of solar electricity – to find a way to have both farming and solar electricity production co-exist and benefit each other.



The scale of the solar system and the on-farm loads determine the required infrastructure configurations to enable the direct supply of electricity for on-farm usage.

2.0 What are the potential benefits?

- Increasing land productivity (food production and electricity generation).
- Protecting/maintaining land for food production – by integrating solar PV panels with farming, agrivoltaics can help to protect and maintain land for food production, rather than converting it entirely to energy production.
- Providing shade and shelter for livestock which can improve livestock welfare and productivity as well as provide social license benefits.
- Improve water use efficiency by reducing water loss from pasture and crops.
- Reducing soil temperatures which may benefit pasture and crop yield.
- Reducing nutrient transfer by having a greater and more even distribution of shade and therefore livestock camping, which can benefit water quality.
- Reducing livestock heat stress and water demands.
- Creation of micro-climate effects and the opportunity that might create for high value alternative crops.
- Contributing to reduced carbon emissions by generating clean energy.
- Cost control of electricity and reduced reliance on the national grid.
- Diversifying revenue streams and improving the financial sustainability of livestock farm businesses.

3.0 What are the potential downsides or risks?

- Reduced agricultural production through reduced pasture and/or crop yields resulting in reduced livestock carrying capacity.
- Disruptions or limitations to future land use.
- Uncertainty regarding impact on farm valuation or resale potential.
- Life cycle impacts due to the mining, manufacture and transport of solar panels.
- Visual, and potentially noise, pollution.
- End of panel life waste and associated environmental risks.
- Uncertainty regarding long term economic feasibility for agrivoltaics, favouring more intensive photovoltaic development.
- High capital costs, which can be prohibitive as a sole land owner.
- Weather or stock damage to panels.

4.0 What is driving the recent interest in large-scale solar generation on Aotearoa New Zealand farm land?

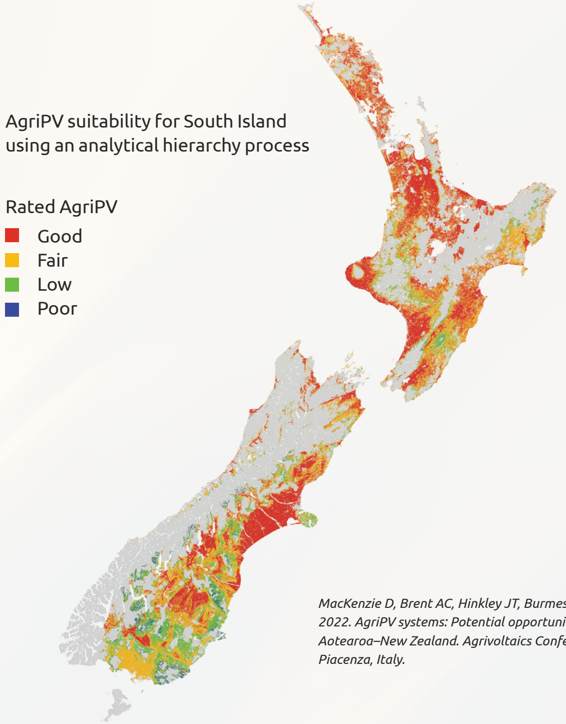
Aotearoa New Zealand is aiming to generate all of its electricity from renewable sources by 2030. Currently, this figure sits between 80-85%, so there is still plenty of work to be done to get to 100%.

Energy use contributes more than 40% to Aotearoa New Zealand's carbon emission. The NZ Government is promoting electrification of the transportation and industrial sectors to reduce carbon emissions. Thereby increasing demand for electricity generated from renewable sources. Consequently, there is much interest in developing renewable energy generation, such as solar PV generation, to meet the increased demand.

In addition, the cost of solar panels has consistently been decreasing, and improvements in technology and design have made it more financially viable to generate large amounts of solar power in Aotearoa New Zealand.

5.0 Is Canterbury suitable for agrivoltaics?

A significant area of Canterbury has been classified as suitable for agrivoltaics (see Figure 1). However, each potential site will have specific factors that need to be assessed when determining suitability. These include slope, shade impacts from surrounding landscape or vegetation, distance from a power transformer and local lines capacity. These factors can impact the efficiency and effectiveness of the solar PV panels as well as the cost and feasibility of connecting to the national electricity grid. Therefore, a thorough site assessment is necessary to determine suitability.



MacKenzie D, Brent AC, Hinkley JT, Burmester D, 2022. AgriPV systems: Potential opportunities for Aotearoa–New Zealand. Agrivoltaics Conference, Piacenza, Italy.

CASE STUDIES

Case studies were carried out for a Mid-Canterbury dairy farm and a North Canterbury sheep and beef farm, looking into the technical and financial considerations of integrating an area of agrivoltaics into each.

Commercial solar systems have either fixed tilt or tracking designs. Fixed tilt, as the name suggests, is where panels are fixed in east-west rows at a north-facing angle designed to capture most sunlight. In contrast, with a tracking layout the panels are in north-south rows and can move to follow the sun from east to west.

Both designs have been modelled for the case studies, but the financial analysis has modelled a single-axis tracking design scenario.

It is important to note that the case-studies are site specific. The actual technical and financial outcomes will depend on site selection, panel efficiency, scale of operations, cost of materials, and so forth.

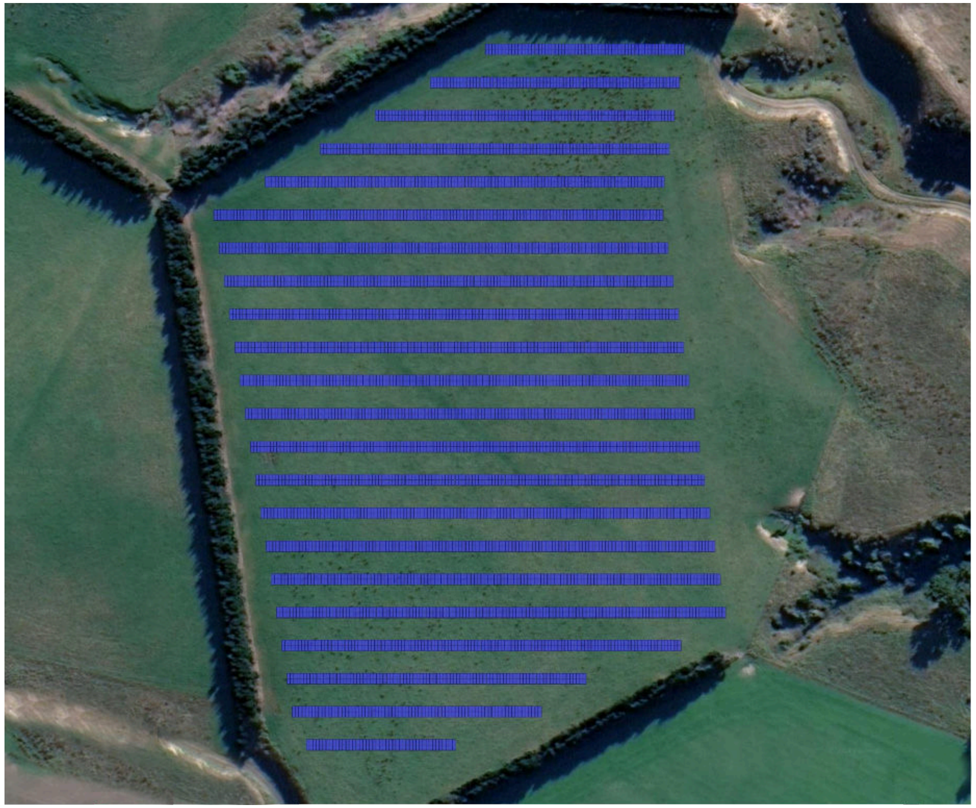
6.0 Sheep and beef case study

The sheep and beef case study was based on a 7,500 stock unit farm in the Hurunui District Council area. With approximately 800 ha hill and 300 ha flat or flat to rolling, the system was based on one flat paddock of 5.8 ha being used for solar panels.

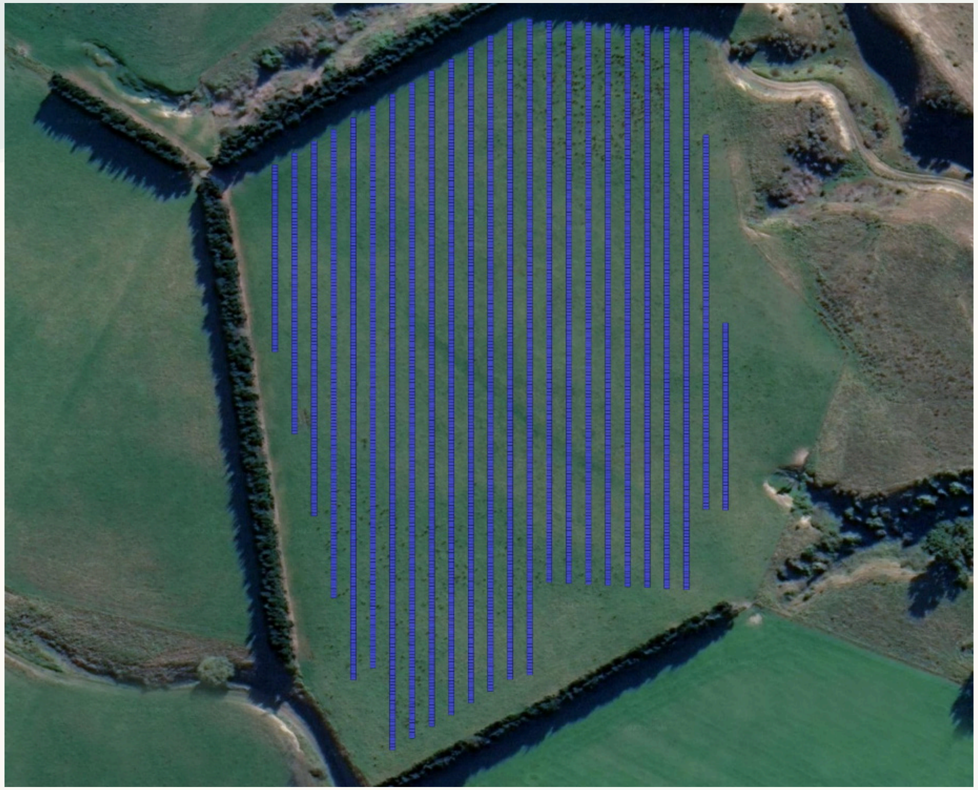
Layouts

Two potential layouts for the site are shown below. These utilise the majority of the paddock, but have wider inter-row clearance than typical solar farms to allow farm equipment to move between the rows to enable dual use of the paddock. There is also a large setback between the array and the paddock boundary. This ensures ease of access and maneuverability.

The layout does not show the central inverter and MV transformer station. This skid-based station is the size of 2 x 20 ft containers and would likely be located in the free area on the eastern side of the array/paddock to minimise cable runs.



View of the fixed-tilt (top) and tracker (next page) arrangements.



Technical details

System	Fixed-tilt	Single-axis tracking
Row spacing (centre to centre) (m)	13.323	8.384
Space between rows (m)	9.0	6.0
Ground cover ratio	35%	28.9%

A single large inverter was chosen due to the scale of the project.

Generation

System	Fixed-tilt	Single-axis tracking
Specific yield (kWh/kWp)	1,533	1,802
Annual energy (MWh)	5,129	4,852

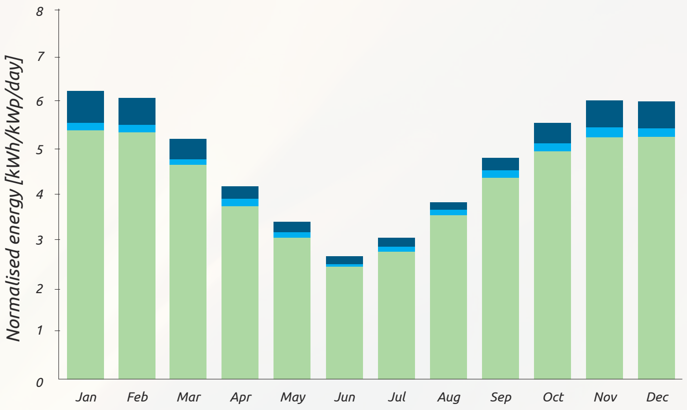
Generation data applies for the project's first year and will degrade over the project lifespan.

Price and revenue

System	Fixed-tilt	Single-axis tracking
Project development, consent, & grid connection ($ NZD)	$625k	$625k
Project design & build ($ NZD)	$4.7 - 6.3 million	$4.3 - 5.7 million
Estimated revenue per megawatt-hour ($/MWh)	96-144	96-144
Estimated annual revenue per hectare ($/ha)	$84k-127k	$81k-123k

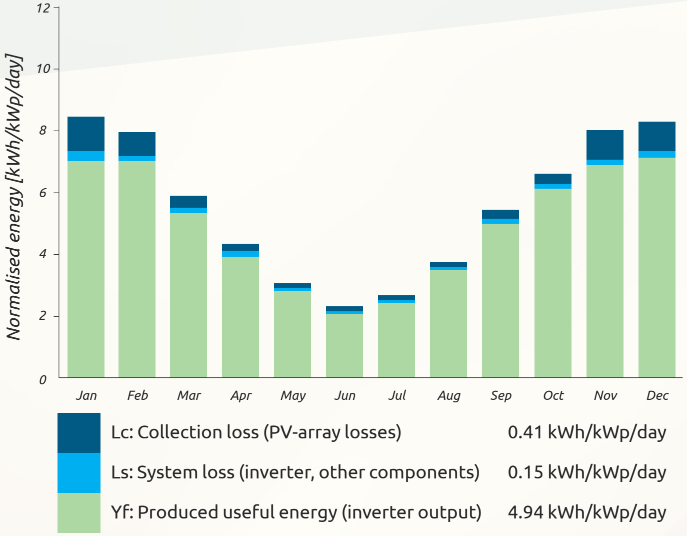
Tracking systems are more expensive per installed power unit (kWp) but generate more electricity per panel and therefore the overall capital cost is lower. They are, however, more expensive to maintain and they can be more susceptible to weather conditions, especially if raised higher above the ground. Overall, the expected revenue is similar, and the choice of design depends on how the land will be used.

Fixed tilt normalised productions (per installed kWp)



🟦	Lc: Collection loss (PV-array losses)	0.35 kWh/kWp/day
🟦	Ls: System loss (inverter, other components)	0.12 kWh/kWp/day
🟩	Yf: Produced useful energy (inverter output)	4.2 kWh/kWp/day

Tracker normalised productions (per installed kWp)



Return on investment – sensitivity analysis

		Solar energy generation annual revenue per hectare ($/ha)						
		$81,000	**$89,000**	**$97,000**	**$105,000**	**$113,000**	**$121,000**	**$127,000**
Capital investment $/ha	$615,625	3.67%	4.04%	4.40%	4.76%	5.13%	5.49%	5.76%
	$678,000	3.34%	3.67%	3.99%	4.32%	4.65%	4.98%	5.23%
	$741,000	3.05%	3.35%	3.66%	3.96%	4.26%	4.56%	4.79%
	$804,000	2.81%	3.09%	3.37%	3.65%	3.92%	4.20%	4.41%
	$865,625	2.61%	2.87%	3.13%	3.39%	3.65%	3.90%	4.10%

Assumptions:
Accumulated 30 year depreciating income (decreasing to 85% by year 30) over initial capital investment requirements.

Does not account for cost of funds, cost to remove and remediate land at end of 30 year term, or any maintenance costs.

Net present value – sensitivity analysis

Net Present Value is a means of predicting what level of return there will be on the initial investment, adjusted to reflect the present value of cash.

		Solar energy generation annual revenue per hectare ($/ha)						
		$81,000	**$89,000**	**$97,000**	**$105,000**	**$113,000**	**$121,000**	**$127,000**
Capital investment $/ha	$616,000	$475,000	$580,000	$684,000	$789,000	$893,000	$998,000	$1,076,000
	$678,000	$416,000	$521,000	$625,000	$730,000	$834,000	$939,000	$1,017,000
	$741,000	$356,000	$461,000	$565,000	$670,000	$775,000	$879,000	$958,000
	$804,000	$297,000	$401,000	$506,000	$610,000	$715,000	$819,000	$898,000
	$867,000	$238,000	$343,000	$447,000	$552,000	$656,000	$761,000	$839,000

Assumptions:
5.5% interest rate, 30-year term with revenue depreciating annually to 85% of the initial annual revenue.

Sheep and beef financial analysis summary

Farm specification	**Status Quo - No solar**		**5.8ha Agrivoltaics @ 30% SR reduction**	
Physical properties	**Open**	**Close**	**Open**	**Close**
Effective hectares	1,180	1,180	1,180	1,180
Sheep SU	5,710	5,710	5,670	5,670
Cattle SU	1,764	1,764	1,764	1,764
Total SU	7,474	7,474	7,434	7,434
Financial summary	**Total**	**Per stock unit**	**Total**	**Per stock unit**
Total farm income (TFI)	$829,153	$111	$1,785,426	$240
Farm working expenses (FWE)	$492,291	$66	$533,095	$72
FWE/TFI	59%		30%	
EBITDA	$336,862	$45.07	$1,252,331	$168
Depreciation	$25,000	$3	$212,500	
Debt servicing	$88,000	$12	$395,485	$53
Net profit (after debt servicing and depreciation)	$223,862	$30	$644,346	$87
Debt servicing/TFI	11%		22%	
Total assets	$9,545,084	$1,277	$14,527,554	$1,954
Equity	$7,945,084	$1,063	$7,302,554	$982
Total debt/land reserves	$1,600,000	$214	$7,225,000	$972
% Equity	83%		50%	
Charges/debt detail	% TFI	Per SU	% TFI	Per SU
Finance charges (incl. curr acc)	10.61%	$12	22.2%	$53
Total charges	10.61%	$12	22.2%	$53
EBITDAR/total asset value	3.53%		8.62%	
Return on equity	2.35%		4.44%	

Assumptions

- Carrying capacity of this area of farm modelled for agrivolataics is 10 stock units per hectare.
- Scenario 1 is status quo with no agrivoltaics.
- Scenario 2 includes 5.8 hectare of panels and models a 30% reduction in stocking rate to reflect the 30% cover ratio of panels to paddock area.
- The reduction in stocking rate in both agrivoltaic scenarios has come from the 1-year trade ewes which typically lamb in and around the paddock selected for the solar panel modelling.
- This area is only running sheep due to cost impact of raising panel height for cattle, and the knowledge that excluding cattle from this area would have minimal impact on the farming system
- Maintained fertiliser, however there are uncertainties regarding solar panel warranties and the use of fertiliser that would need to be investigated further.
- Maintained cropping and pasture renewal, however practicalities and logistics would need to be considered before cropping or renewing pastures under the panels.
- Operating, maintenance and insurance costs for solar panels is based on 0.5% of the capital costs.
- Also included is the cost to replace the inverter in year 12-15. This cost of approximately $350,000 has been split over the 30 year lifespan for the purposes of this finanical modelling.
- Depreciation of solar panels has been calculated over expected lifespan of 30 years.
- End of panel life removal, waste management and remediation of the land back to farming or installing new panels has not been included in this modelling.
- Tax has not been calculated or included in these analyses.

Key findings/explanations

- Income increased due to additional solar income by $956,273.
- Expenses increased by $40,804, due to solar running costs.
- Depreciation lifted by $187,500 ($5,625k/30 years), due to 30-year life span of solar panels.
- 100% of solar panel development funded through borrowings, therefore term loan increase by $5,625,000.
- Assumes no principal repayments, solar panel cost covered through depreciation.
- Net Profit (after debt servicing and depreciation) increased by $420,484.
- Return on Asset (EBITDAR/Total Asset Value) increases from 3.53% to 8.62%.
- Return on Equity (Net Profit/Equity) increases from 2.35% to 4.44%.

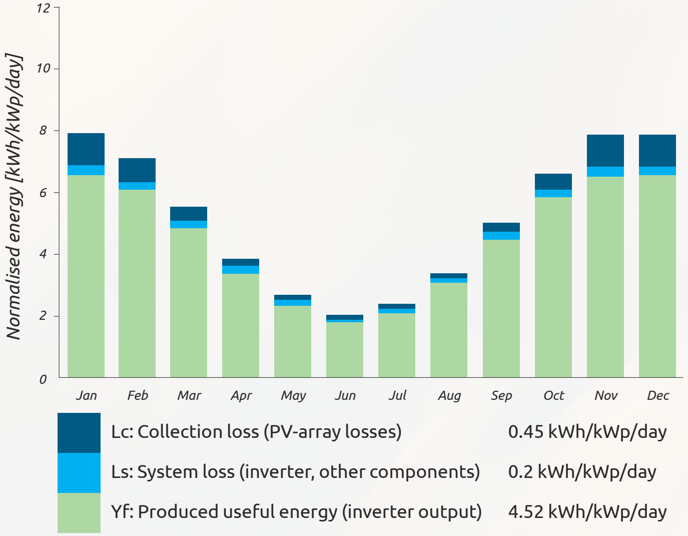
7.0 Dairy case study

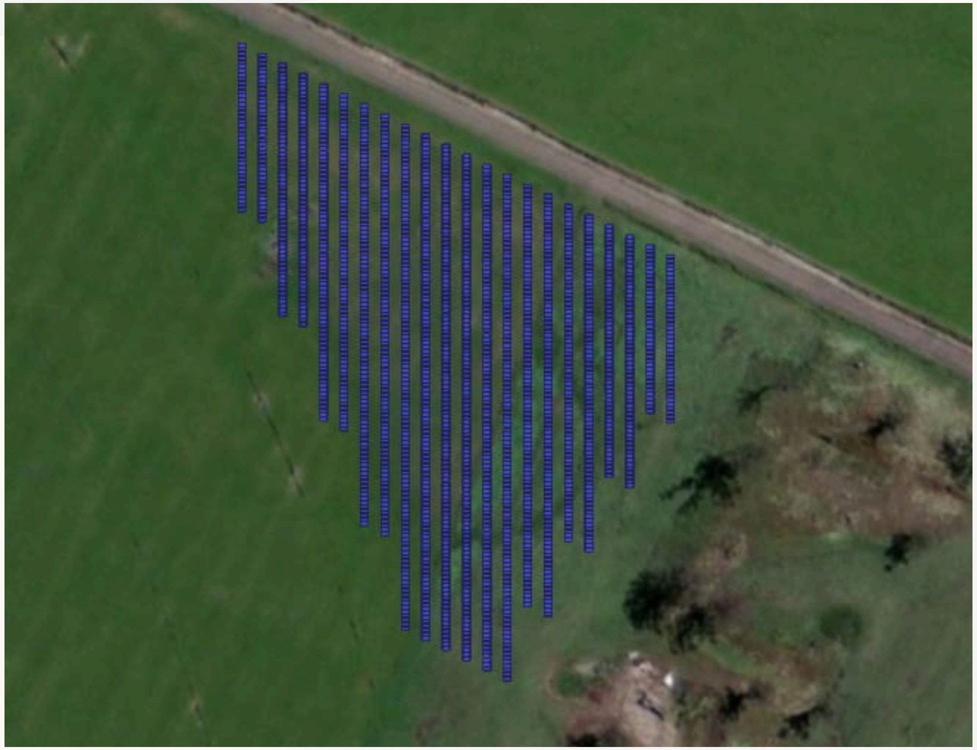
The second case study was a dairy farm in Canterbury's Selwyn District Council area milking 900 cows under pivot irrigation. Solar panels under pivots are not currently recommended due to warranty concerns for the solar panels and framing.

For this reason, a small (2 ha) dryland area was identified as an appropriate potential site to model. This area is still grazed by cows, but holds less grazing value than the irrigated area.

Fixed tilt layout

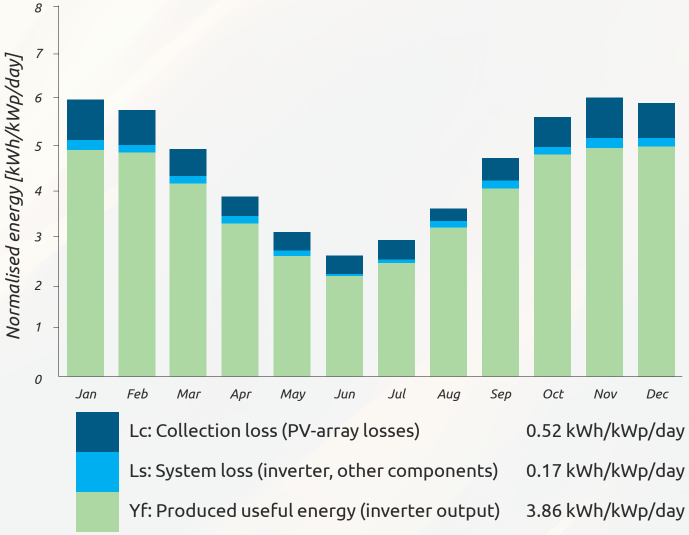
Fixed tilt normalised productions (per installed kWp)





Tracking Layout

Tracker normalised productions (per installed kWp)



Technical details

System	Fixed-tilt	Single-axis tracking
Row spacing (centre to centre) (m)	10.32	6.38
Space between rows (m)	6.0	4.0
Ground cover ratio	45%	36%

A string inverter design (multiple smaller inverters) was chosen due to the scale of the project.

Generation

System	Fixed-tilt	Single-axis tracking
Specific yield (kWh/kWp)	1,408	1,649
Annual energy (MWh)	2,045	2,003

Generation data applies for the project's first year and will degrade over the project lifespan.

Less energy (kWh) is generated per installed power unit (kWp) or PV panel with fixed tilt designs compared with tracking designs, because of the prolonged exposure to sunlight.

Price and revenue

System	Fixed-tilt	Single-axis tracking
Project development, consent, & grid connection ($ NZD)	$350k - $390k	$350k - $390k
Project design & build ($ NZD)	$2.6 - $2.9 million	$2.1 - $2.7 million
Estimated revenue per megawatt-hour ($/MWh)	$96-$144	$96-$144
Estimated annual revenue per hectare ($/ha)	$98k-$147k	$96k-$144k

Tracking systems are more expensive per installed power unit (kWp) but generate more electricity per panel and therefore the overall capital cost is lower. They are, however, more expensive to maintain and they can be more susceptible to weather conditions, especially if raised higher above the ground. Overall, the expected revenue is similar, and the choice of design depends on how the land will be used.

A sensitivity analysis can be used to determine how output variables are affected based on changes to other independent variables. In the following tables, sensitivity analysis shows the impact to Return on Investment and Net Present Value, respectively, from changes to the capital investment required and the annual revenue received.

Return on investment is a simple calculation used to try to predict the return of an investment relative to the cost of the investment. A limitation of return on investment is that it doesn't account for a project's time-frame.

Return on investment – sensitivity analysis

		Solar energy generation annual revenue per hectare ($/ha)						
		$98,000	**$108,000**	**$116,000**	**$124,000**	**$132,000**	**$140,000**	**$147,000**
Capital investment $/ha	$1,225,000	2.23%	2.46%	2.64%	2.83%	3.01%	3.19%	3.35%
	$1,330,000	2.06%	2.27%	2.44%	2.60%	2.77%	2.94%	3.09%
	$1,435,000	1.91%	2.10%	2.26%	2.41%	2.57%	2.72%	2.86%
	$1,540,000	1.78%	1.96%	2.10%	2.25%	2.39%	2.54%	2.67%
	$1,645,000	1.66%	1.83%	1.97%	2.10%	2.24%	2.38%	2.50%

Assumptions:
Accumulated 30-year depreciating income (decreasing to 85% by year 30) over initial capital investment requirements.

Does not account for cost of funds, cost to remove and remediate land at end of 30-year term, or any maintenance costs.

Net present value – sensitivity analysis

Net present value is a means of predicting what level of return there will be on the initial investment, adjusted to reflect the present value of cash.

		Solar energy generation annual revenue per hectare ($/ha)						
		$98,000	**$108,000**	**$116,000**	**$124,000**	**$132,000**	**$140,000**	**$147,000**
Capital investment $/ha	$1,225,000	$119,781	$250,487	$355,052	$459,617	$564,182	$668,747	$760,241
	$1,330,000	$20,255	$150,961	$255,526	$360,091	$464,656	$569,221	$660,715
	$1,435,000	-$79,271	$51,435	$156,000	$260,565	$365,130	$469,695	$561,189
	$1,540,000	-$178,797	-$48,091	$56,474	$161,039	$265,604	$370,169	$461,663
	$1,645,000	-$278,323	-$147,617	-$43,052	$61,513	$166,078	$270,642	$362,137

Assumptions:
5.5% interest rate, 30-year term with revenue depreciating annually to 85% of the initial annual revenue.

Dairy case study financial analysis summary

Year Ending: 31/5/2024

	Status quo - no solar			2 Hectare agrivoltaics - no grazing			Variance		
Key financial performance indicators:	Total	Per Ha	Per kg MS	Total	Per Ha	Per kg MS	Total	Per Ha	Per kg MS
Total farm income (TFI)	$3,395,045	$14,441	$8.22	$3,635,045	$15,462	$8.80	$240,000	$1,020.84	$0.58
Farm working expenses (FWE)	$2,259,307	$9,610	$5.47	$2,288,113	$9,733	$5.54	$28,806	$122.53	$0.07
FWE/TFI	67%			63%					
EBITDA	$1,135,738	$4,831	$2.75	$1,346,932	$5,729	$3.26	$211,194	$898.32	$0.51
Depreciation	$72,000			$176,000			$104,000	$0.00	$0.00
Loan interest payments	$357,225	$1,519	$0.86	$528,825	$2,249	$1.28	$171,600	$729.90	$0.42
Current ACC interest	$18,438	$78	$0.04	$18,438	$78	$0.04	$0	$0.0	$0.0
Total debt servicing & depreciation	$447,663	$1,904	$1.08	$723,263	$3,076	$1.75	$275,600	$1,172.27	$0.67
Net profit (after debt servicing and depreciation)	$688,075			$623,669			-$64,406		
Total assets	$14,231,590	$60,534	$34.46	$17,351,590	$73,805	$42.01	$3,120,000	$13,270.95	$7.55
Equity	$7,736,590	$32,908	$18.73	$7,736,590	$32,908	$18.73	$0	$0.00	$0.00
Total debt	$6,495,000	$27,627	$15.73	$9,615,000	$40,897	$23.28	$3,120,000	$13,270.95	$7.55
% Equity	54%			45%					
EBITRD/total asset value	7.98%			7.76%			-0.2%		
Return on equity	8.89%			8.06%			-0.8%		

Assumptions

- Fertiliser and regrassing costs would reduce by $775.80/h.a
- Supplement harvesting costs (9.5t DM total @ $0.19kg DM) would be reduced by $893/ha, as the majority of the dryland feed is grown when there is a surplus.
- The reduction in pasture would be replaced by PKE (16t DM @ $480/t) which would equate to $3840/ha.
- There would be additional running costs from the increase in bought-in supplements of $792/ha.
- Tax has not been calculated or included in these analyses.
- Panel height has been increased to allow cattle to be able to access shade under the panels when grazing adjacent paddocks. However, there is limited grazing value from this area that the panels are located.

Key finding/explanations

- Income lifted due to additional solar income by $240k, installing solar has little to no effect on current farm income.
- Expenses increased by $28,606, mainly due to solar running costs but also additional supplement to off set loss of dryland.
- Depreciation lifts by $104,000 ($3,120k/30 years) due to 30 year life span of solar panels.
- 100% of solar panel development funded through borrowings, therefore term loan increase by $3,120,000.
- Assumes no principal repayments, solar panel cost covered through depreciation.
- Net Profit (after debt servicing and depreciation) drops by $64,400 due to increase borrowing as 5.5% not being covered by increase income.
- Return on Asset (EBITDAR/Total Asset Value) drops from 7.98% to 7.76%.
- Return on Equity (Net Profit/Equity) drops from 8.89% to $8.06%.

8.0 Case study assumptions

- System prices include all materials and installation needed for a typical system as delivered by Infratec New Zealand, subject to further site investigations. Material prices, physical site conditions, local grid capacity as well as division of scope with the landowner will significantly impact costs.
- Development and grid connection costs are indicative of a typical system of that size that size but can vary significantly based on the studies required and potential line/grid upgrades.
- Revenue is estimated based on historical average wholesale electricity prices. Subject to confirmation during project development.
- In solar design there are fixed tilt and tracking designs. Fixed tilt, as the name suggests, is where panels are fixed at an angle designed to capture most sunlight. In contrast, the tracking layout has the ability to move, prolonging exposure to direct sunlight. However, they can be more expensive to install and maintain, and there is some suggestion that they can be more susceptible to weather conditions.
- Yield is estimated based on the specified system configuration and can vary significantly based on site location, shading elements, and further development of the design.
- Space between array for a horizonal tracker system is defined when the modules are tilted towards a horizontal position (minimum row space).
- The specified panels are guaranteed to decay at a linear rate for 30 years. However, other components such as inverters will need maintenance and may require replacement during that project lifespan.
- The above analyses are based on the findings of the modelled farms. The actual ROI will depend on site selection, panel efficiency, scale of operations, cost of materials, etc.

KEY QUESTIONS

In the dairy scenario, the capital cost is greater due to the increased height above the ground that the panels need to allow cows to graze underneath. However, there is a greater opportunity to use electricity generated in the dairy business to run the dairy shed, irrigation and potentially in the future any electric vehicles than there is in the sheep and beef scenario, due to the greater electricity demands of the dairy system.

9.0 Is it feasible for my farm?

It is possible to design an agrivoltaic system that works in Aotearoa New Zealand, but because it is a new concept in this country we do not know all of the impacts it could have on farming.

The capital cost of development is significant and places limits on financial return and viability. One way to overcome this is to consider a partnership or leasehold arrangement, which has the added benefit of technical expertise provided by the external partner or lessee. In order for farmers to have confidence in having conversations with potential partners or lessees, expert advice is also recommended.

There are limitations to electricity distribution capacity currently in Aotearoa New Zealand, which may limit the speed and extent to which solar or agrivoltaic developments can progress.

Taking a short-term view, it may be difficult to look beyond a utility-scale solar farm that does not allow for continuing food production, from a financial investment point of view. Long-term however, the benefits of agrivoltaics are clear, and there are currently some protections on high value food producing land that places limits on land use to prevent it being taken out of food production, but this an area that requires further attention.

10.0 What ownership structure makes sense for me?

1. Privately owned – the land owner owns the solar plant and is responsible for its operation and maintenance. Electricity generated can be used by the farm business and/or sold to the national grid.
2. Third party ownership – a third party owns the solar plant and pays a lease to the land owner for the use of the land (and is responsible for operation, maintenance, removal and remediation of land at the end of the tenure) and/or negotiates an arrangement to supply electricity to the landowner if of appropriate size and properly embedded into the farm infrastructure, in return for the use of the land.

11.0 What is a good approach when assessing a solar development?

1. **Use the agrivoltaic assessment tool for farmers to determine initial suitability** – link
2. **Consult with family and/or business partners** – The decision to invest or lease land to solar is a significant one. It is important that family and business partners are aware of all of the long-term implications of this development.
3. **Expert Advice** – Consult with your trusted experts. This may include your lawyer, accountant, farm consultant with expert knowledge in solar development, insurance provider, bank/lender, local council, etc.
4. **Research the solar energy provider** – Where possible talk to other farmers and experts working with this provider.
5. **Understand local planning resource consent requirements.**
6. **Have a clear understanding of potential agreements and contracts** – Engage with experts to ensure that the documentation accurately reflects the agreement and that there is a clear understanding of the terms of the agreement, such as length of lease, land use restrictions and limitations, design factors and how they impact agricultural yields, land remediation at the end of the lease, rent reviews, access arrangements – frequency and permissions required, and what happens in the case of land sale.
7. **Discuss plans with neighbours and consider screening options.**

Resources

nzfarmlife.co.nz/agrivoltaic-research-takes-off/

openei.org/wiki/InSPIRE/5_Cs

ise.fraunhofer.de/en/publications/studies/agrivoltaics-opportunities-for-agriculture-and-the-energy-transition.html

sciencedirect.com/science/article/pii/S0306261923004944

nzte.govt.nz/blog/solar-pv-an-introductory-guide-for-new-zealand-landowners

12.0 Project team

Anna Vaughan, Tambo NZ Ltd – Project Lead

Anna has a B.Ag.Sci (Hons) and has spent her career working with the sheep and beef sector. This has included farm management, project and program management and farm consulting and extension. This combination of experience has made her focused on looking for and incorporating novel solutions into farm systems that ensure the long-term sustainability of food and fibre production in Aotearoa New Zealand.

Megan Fitzgerald, Tambo NZ Ltd

Megan grew up on a mixed cropping, sheep and beef farm in Mid Canterbury. She has completed Masters at Lincoln and studied at Wageningen, Netherlands. Her passion lies in helping farmers navigate the changing business environment to ensure their businesses are operating efficiently and making the most of opportunities. She does this through supporting farmers to develop proof of concept for innovate ideas such as this solar project, the sheep milk industry, and short value chains.

Alan Brent, Victoria University of Wellington

Alan is a professor of and the Chair in Sustainable Energy Systems in the Wellington Faculty of Engineering at Te Herenga Waka Victoria University of Wellington. For the past 15 years his research has primarily focussed on alternative energy technologies and systems that are appropriate for specific contexts. To this end he is passionate about working with communities on the ground to enable our just transition to a net zero carbon economy in a sustainable way.

Jasper Kueppers, Infratec

Jasper is a renewable energy engineer on the Business Development Team of Infratec, which he joined in 2020 after completing his Bachelor of Engineering with Honours degree at Te Herenga Waka Victoria University of Wellington. He is currently working on the development of solar farms and utility-scale battery projects across Aotearoa New Zealand.

Ellie Wright

Ellie is studying towards a Bachelor of Engineering with Honours with a major in Electrical and Electronic Engineering and a specialisation in Renewable Energy Systems Engineering. During the summer of 2022-23, at the end of her second year, Ellie worked under a scholarship from Victoria University of Wellington in collaboration with Infratec to investigate the feasibility of agrivoltaics in Aotearoa New Zealand. She analysed existing literature and the emerging agrivoltaic market in conjunction with local agricultural practices, and determined that the framing would need to be more robust. She then designed appropriate fixed-tilt and single-axis tracking systems for the two case studies that were undertaken.

More information on their organisations can be found here:

tambo.co.nz

wgtn.ac.nz/sustainable-energy-systems

infratec.co.nz

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