BEFORE A COMMISSIONER APPOINTED BY THE SELWYN DISTRICT COUNCIL

IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	applications by KeaX Limited for resource consent to establish a solar array at 150 Buckleys Road and 115 Buckleys Road, Brookside, Selwyn Brookside.

STATEMENT OF EVIDENCE OF CAMPBELL MCMATH

ON BEHALF OF THE APPLICANT

(OPERATIONS)

Dated: 16 February 2024

KeaX Limited
Applicant
Campbell McMath
(campbell@keaenergy.nz)

Applicant
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1 INTRODUCTION

1.1 My full name is Campbell John McMath. I am the Managing Director (MD) of KeaX Limited, which I co-founded with my wife (Naomi) on 29th April 2020. We undertake consultancy work, contracting work and R and D projects in the field of solar generation and self-consumption of power, as well as developing solar farms.

1.2 Although, our journey started on one of our family dairy farms in Selwyn with some mini-hydro power stations over 10 years ago, from there it grew into a retail company, and moved into solar farms supporting local farms.

1.3 I have been installing solar farms for over 10 years, throughout New Zealand and the Pacific Islands. My work involves developing sites, design, engineering, procurement, construction, consultancy, trading energy, trading renewable energy certificate, retailing energy, environmental matters, and customer relations.

1.4 It is a passion of mine generating power and retailing a product that I have created. A feather in our cap is in January 2021 we constructed New Zealand's largest solar farm in the Wairau Valley, Marlborough, which was also New Zealand's first utility scale solar farm.

1.5 We also live what we preach, our family (my wife and two daughters) happily living directly under solar panels and next to inverters. When we work up in Marlborough from time to time we live on a solar farm.

1.6 For this proposal, KeaX has partnered with Ethical Power, we find Ethical Power have a very similar ilk. Ethical Power has extensive experience in developing solar farms in the UK, Europe and New Zealand, and has been responsible for deploying over NZ$4bn into clean renewable energy. They also have

(a) built and still operate the first two large scale solar farms in the UK, and are developing

(b) 9 projects totalling 400MWp in New Zealand.

2 SCOPE OF EVIDENCE

2.1 My evidence is related to operational matters (from an applicant/operator perspective) and to give an overview of the project:

(a) Describes Kea Group business and how we are local.

(b) Overview of the Buckleys Road project

(c) Describes the need for renewables, Government Policy, and other operational matters.

(d) Addresses operational and technical matters raised by submitters and in the reporting officer's section 42A report.

(e) Community Consultation

(f) Employment opportunities

3 **KEAX**

3.1 KeaX Limited is part of the Kea Group, which includes Kea Energy, our Generator/Retailer arm. 'We are regionally based, and in relation to this application, as local as you can get with a head office around 4500 metres from the site.

3.2 We support farmers and the rural community, our staff include Selwyn residents, including providing work experience to students and those looking to experience in the energy sector. There have been numerous times when working overseas we take Selwyn staff to help build solar farms in the Pacific Islands and give the Selwyn staff experience working overseas which they would not have otherwise had.

3.3 There are a number of businesses and residential customers in the area using us to supply their power. We know all our customers by name and it brings a real family touch to how our business operates. We have Selwyn businesses wanting us to supply them with power as they want to be part of the Kea group and support local, and we often have to turn them down as we simply do not have enough generation (power) to supply them.

3.4 Part of our local community commitment is also supporting the Ellesmere Lions golf tournament, the annual Special Childrens Christmas Party at Wolfbrook Arena and providing educational tours for Lincoln University, Canterbury University, CPIT (Ara) and 12 year

olds at Cobham intermediate. We believe in investing in our future not just with finance but time as well, and Kea has been awarded gold from the Selwyn Responsible Business Awards in 2017, and 2019.

4 OVERVIEW OF THE BUCKLEYS ROAD SOLAR FARM

4.1 The Buckleys Road Solar Farm project facts:

(a) The site will generate approximately 100 GWh per year, and is enough to power around 11,200 houses. According to the 2018 census, Selwyn had 23,244 houses, so this Proposal could provide power to approximately 48% of houses in the District.

(b) At 103g/kWh (16/2/2023) (a little below average), the Proposal will offset around 10,300 tons of CO_2 per year helping to achieve the objective of the NPS REG[1] , and New Zealand help achieve zero carbon, as part of the Climate Change Response (Zero Carbon) Amendment Act in 2019.

(c) A likely scenario is Orion's summer load on a typical summer day in 2023 is around 400MW. If the Proposal is generating 50MW, it will be supplying 12% of Orions power from the solar farm, delivering 100% renewable generation. It is a significant project with a relatively small footprint.

(d) The Site is located on about 111 Ha as part of an existing dairy farm.

(e) Kea uses small scale construction methods which are low impact, an example of this would be the piles are hit straight into the ground, much like a fence post, this minimises the footprint. We did look at pre-drilling and concrete blocks but found they had a much larger environmental impact, take much longer, and as such are opposed to these methods.

(f) The solar farm at first glance appears to cover a large area, but the reality is quite different. The total area of land used by the

[1] To recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities, such that the proportion of New Zealand's electricity generated from renewable energy sources increases to a level that meets or exceeds the New Zealand Government's national target for renewable electricity generation.

solar farm piles and inverters on the site is very small at approximately 1011 sqM less than 0.1% (approximately ½ x 50 bail rotary cowshed) still leaving over 99.8% of the land available to be farmed. This is over 110Ha of primary production land that can be farmed using intelligent, high-tech methods, around and under the panels, as demonstrated by Dr. Beechey-Gradwell, Mr. Stuart Ford, and Kea's present operations.

(g) Waitaki power station has a capacity of 105MW but this requires a manmade lake around the size of 442 Ha. (4,420,000 m^2)

(h) Once construction is complete, the construction road can become overgrown with grass, allowing for a continuation of farming.

5 SITE SELECTION

5.1 Choosing a site is not as simple as finding a block of land under a power line. Other considerations need to be investigated and sometimes compromises need to be made. Considerations that need to be investigated and certainly not limited to this list, are:

(a) undertake a range of studies including electricity modelling (this looks at protection for protecting equipment, voltage stability, frequency stability, power factor, Var control, capacity of the line(s), just to name a few parts of a study), feasibility, land type (is it suitable for piles),

(b) consider proximity to ports, roads, and other infrastructure such as substations and power lines with capacity available (in short simply to use existing infrastructure to transport the power), for access,

(c) understand and analyse sun hours

(d) consider historic and expected future power prices, investigating where new generation and load is, what would be the expected price and demand in this particular area.

(e) Capacity on lines and substation.

(f) Resilience is essential. Three 66kV lines feed Brookside (see **Attachment 1**).

(g) Proximity to a feasible grid connection point;

(i) this is to keep our environmental footprint low,

(ii) the network is safer, as there are less lines and poles which can be road hazards (less poles means less chances of cars vs poles, which is more chance of reducing the road toll), and cables in the ground which people can dig up. The network is safer with solar farms next to existing infrastructure.

(iii) There are less raw materials in the equipment, needed for transmission, there are less wasted losses in transmitting the power. If equipment can have dual use (import and export) it becomes much more environmentally friendly.

(h) Of a sufficient area to develop a solar farm of a size which is viable and will make a meaningful contribution to the generation of new renewable energy in New Zealand

(i) Free of ecological, constraints (as shown by Dr. Jaz Morris for the regional consent application) which would make the project untenable by a responsible developer.

(j) Medium to high sunshine hours / limited shading from natural features such as mountains, such as the alps in the west.

(k) Easy to visually screen as land is flat and the majority of the site is already screened, which is a minimal impact to neighbours as shown by Ms. Anthony's report.

(l) A willing landowner, there is a need for a relationship between a landowner and developer to work together. Also a landowner wanting to lease or sell at an agreed rate.

(m) There is an importance of being at substations, the existing equipment is grossly underutilised if not used in both directions. Better not just for economics but the environment. There is no doubling up of equipment, which results in less faults.

(n) N-1 importance, resilience. If one part of the network fails, there is another part which can pick up the load/generation. You need a backup to allow for failures and faults.

(o) Requires large flat land area (less than a 5 degree slope) needed with good ground conditions.

(p) Helping NZ meeting NPS -REG targets.

(q) Economic reason for large scale:

(i) Large purchasing power of equipment.

(ii) Equipment can be economically maximised i.e. sharing a large transformer is cheaper then lots of single transformers of the same total MVA rating (for example 1 x 40MVA vs 40 x 1MVA), same switchgear.

(iii) Existing cable and transformer efficiency.

(iv) Investment certainty is needed.

(v) Project needs to be Economic

(vi) Fixed costs to cover.

(vii) Minimum size is needed.

(r) A meaningful size which is going to help New Zealand achieve its net zero goals and reduce GHG.

5.2 There is an operational need here, and this is driven by the "Brookside substation", this is connected to Orion's 66kV rural network which is the sub-transmissions lines connecting substations to other substations there are some key elements for its need here;

5.3 This Site was chosen due to its proximity to load, being near existing infrastructure, including a substation and multiple power lines, and generally meeting the requirements in 5.1. The electrical system is also near perfect as it offers three directions for the electricity to flow. The sub-transmission lines from Brookside connect to:

(a) Springston then Islington in one direction,

(b) Killinchy then Dunsandel then Hororata in another and;

(c) Norwood is another which is being constructed.

Please see **Attachment 1**.

5.4 Being close to the load reduces network losses and GHG i.e. the power does not need to be transmitted long distances. It also saves on upgrading large transmission lines, contributing to more affordable power for the end user. Not only are there losses of electricity but this equates to GHG emissions associated with the losses. Transpower's statement on such losses is that: "Transmission losses are a result of resistance caused by electricity passing through National Grid transmission lines and switchgear. The GHG emissions associated with transmission losses arise from the relative carbon intensity of the electricity generation mix. For FY22, these were estimated at 168,927 tCO2-e (a decrease of 17% reported in FY21)." https://www.transpower.co.nz/about-us/sustainability/our-carbon-footprint

5.5 Having multiple directions for power to flow allows for an increase in energy security and resilience. It has other benefits such as finer voltage control in the area, allowing for a more stable grid.

5.6 The Brookside substation is already planned to be upgraded as per Orion's AMP, this upgrade is not related to the solar farm.

6 **Why not somewhere else?**

6.1 I understand that some of the submitters have questioned why the solar farm could not be located in a remote area "*parts of Motukarara*" and other submitters proposing that it be located closer to town's "*Selwyn's larger townships*" and a new substation constructed. Substations are expensive to build. For example, the cost of building a new substation (please see **Attachment 1**), Orion's Norwood site cost Orion around $58 million, as shown in Orion's 2023 annual report.

6.2 It is not economic and as not environmentally friendly to have a PV connection of the size we are proposing on equipment dedicated to a solar farm, i.e. if a substation was just for a solar farm, the solar farm

would bear that cost, but as it is sharing equipment with load it makes for a more economical connection not just financially but environmentally less impact. A good example is that during the day the lines will be exporting and during the night they will be importing, it is 2-way. It is therefore not economically viable for a new substation to be built for this proposal especially given that we are trying to make energy affordable for all. On top of the economic cost it would be a gross underutilisation of existing infrastructure.

6.3 When costs of other upgrades in the Orion Selwyn area are looked at, (shown in the Orion Asset Management Plan 2019), upgrades such as overhead lines to Brookside being installed to increase resilience, load capacity and support growth in Selwyn District and western Christchurch, the total forecast is $28.937M.

6.4 As investigated by the Boston Consulting Group (2022) New Zealand's capacity needs to increase by 163% in 26 years. The works are needed to address growth through population, de-carbonising, agriculture use (pumps, irrigators, dairy sheds, vehicles) just to name a few in the Selwyn District.

6.5 The Solar farm will be helping to supply renewable and affordable energy to this growth area. The solar farm will be using the existing and planned upgraded network (recall power can flow both ways). In doing so this may also defer Orion's capital cost in the network at a later date, as the generation is embedded (generated where it is needed, near load), an upgrade in a certain area in the future may not be needed.

6.6 Some of the works shown in Paragraphs 6.1 and 6.3 provided KeaX with an opportunity to utilise existing, upgraded, and soon to be upgraded assets (such as the new Norwood GXP and Norwood—Brookside line (being constructed at present)) to construct and operate a solar farm. Overall, it is efficient, economic and sustainable to be using assets in both directions, i.e. the power lines and equipment is used for both import and export. It makes energy more affordable for all, as the asset will work harder and smarter, it also makes this proposal feasible.

6.7 Furthermore, when we investigated other substations in the Selwyn area, all had their own types of issue(s). The key issues are listed below:

(a) There is insufficient capacity i.e. the substation is too small or the capacity had been committed to other proposed/consented solar farms. .

(b) There are too many limitations and/or restrictions on the line.

(c) They are in a weak part of the network i.e. they did not have the energy security we need (i.e. between multiple Transpower feeds (GXP))

(d) Location was not appropriate i.e. too close to urban areas or too remote and not near any infrastructure.

(e) Land prices were too high.

6.8 Disasters such as earthquakes and wind storms remind us of how important energy is for our lives. Having generation close to the load will help bolster energy security during these disasters. For example, a fault on one or more of the transmission line(s) heading south would put stress on the grid. These lines include:

(a) Islington-Roxburgh

(b) Christchurch – Twizel

(c) Benmore – Islington

6.9 In this circumstance, the Christchurch grid would become strained and the need for 'local' power generation and transmission would be essential, and this solar farm offers that.

6.10 I cannot underplay the importance of resilience, this is the ability for a network to get through a fault, disaster, accident, and maintenance, it needs to be flexible. In short keeping the lights on.

6.11 Two examples of where resilience was/is needed Hawkes bay Cyclone and AF8 (alpine fault magnitude 8) AF8 is a group of the civil defence organisations, modelling the alpine fault.

6.12 Focusing on resilience (source https://af8.org.nz/)

(a) AF8 research indicated 75% probability of alpine fault occurring in the next 50 years. Some of this statement could be related to other natural disasters which we cannot predict.

(b) The South Island electricity generation and distribution network will be severely compromised the AF8 stated "The impact of the initial quake and wider aftershocks will cause most South Island hydro-electric generation plants to shut down. Damage will occur to some transformer sites. National and local distribution networks will be damaged, particularly where pylons or poles are located in steeper, less stable terrain. Dams and canals may be compromised directly by shaking and ground deformation and indirectly by landslide into or below structures. The Key point here are some local generation and distribution is anticipated to be achieved in less severely affected later in the first week of response"

(c) Seen this in Hawkes Bay, with cyclone Gabrielle.

(i) Ara Ake CEO Cristiano Marantes said "the focus needed to be on resilience to high-impact, low probability events such as cyclone Gabrielle" and "A network of micro grids generating their own power will be needed if New Zealand's electricity network is to cope with increasing extreme weather"

(ii) 22-2-2023 CEO of Vector Simon Mackenzie quote "Current regulation does not facilitate the type of innovation or level of investment required to boost resilience and achieve an affordable decarbonisation. If we want to enable the change that's needed, we need to act now"

(iii) 22-2-2023 Mercury chair Prue Flacks said "Resilience of critical infrastructure needs to be one of New Zealand's biggest priorities. We know that weather events will become increasingly severe, and we need to adapt.

(d) The Buckleys Road project is part of the local generation, and the closer generation is to load centres the better (less then 30kM from Christchurch). Also shown in **Attachment 2** the solar farm has 3 circuits feeding the 66kV substation, this is unusual but incredibly useful when dealing with faults and outages.

6.13 Other locations, investigated and also a brief on illustrating some of the reasons that they are not suitable.

(a) **Norwood area**

(i) There is a recent solar farm application under way here.

(b) **Dunsandel area**

(i) There is no capacity already has a solar farm assigned

(c) **Te Pirita at the end of a 66kV line (DOG)**,

(i) capacity is limited.

(ii) There is only one line (risky), the resilience is low (it is too high of a risk for us), there is no N-1, there is too much economic risk.

(d) **Brookside area Non-HPL just some of the following reasons why.**

(i) There is a non HPL site say 3.1km to edge of site. The distance is getting to far for the HV (33kV) cable, which is needed i.e. the cables would need to be larger to travel that distance, also multiple cables would be needed it would be uneconomic to cable.

(ii) Other costs such as easements, consents and multiple road crossings will be expensive, even if at all possible, issue with private company owning private network in public roads/areas, legal minefield

(iii) Extra capital expenditure on HV (33kV) cables, it is not a cheap cable.

(iv) Wasted Cu /Al, which is not environmentally friendly, simply not in our DNA to waist resources, Kea want to maximise utilisation.

(v) Amount of road which would need to be dug up as several circuits would be required and spaced accordingly due to heat (region of .5 to 1M apart per circuit).

(vi) If we recall amount of energy being transported 50MW, Orion summer load typically 400MW on a typical summer day around 12% of Orion's power will be from the solar farm.

(vii) There is increase losses / wasted energy by traveling longer distances.

(viii) Would still need to secure the land. Land is not guaranteed.

(ix) There is a greater risk to the public, i.e. more cables in the ground allow for more risk of being dug up.

6.14 I do not believe that there were many other opportunities available to us to proceed with a proposal of this scale and nature at a site with a lower (or no) highly productive land classification. There are areas where there is non-HPL but do not meet requirements list in Paragraph 5.1. More importantly Mr. Ford's report shows that, the HPL is still being used for primary production.

7 THE NEED FOR RENEWABLES

7.1 I understand that the Government has committed to New Zealand transitioning to Net Zero carbon by 2050 including doubling New Zealand's renewable electricity sector and is developing policy packages which aim to accelerate the deployment of renewable electricity generation and reduce carbon emissions. It is well recognised that there is an urgent need to provide for increased renewable electricity generation.

7.2 The new Government has stated that it intends to introduce new (updated) national direction for renewable energy. National's Electrify NZ policy indicates that their new NPS-REG would make solar, wind, geothermal and biomass a controlled activity under the RMA, requiring councils to update their plans so that consents for these generation types become near-automatic. The Policy also indicates that it will require decisions on resource consents for non-hydro renewable generation to be issued in one year. However, I recognise that this is not the current consenting regime.

7.3 Transpower study states "60-80% increase in electricity demand by 2050"

7.4 Orion AMP states "Winter peak demand on our network is anticipated to increase by approximately 114MW (18%) over the next 10 years"

7.5 Orion load increase by 2050 expected to increase from around 630 X 1.7 to 1071MW an increase of 371MW.

7.6 According to the Boston Consulting Group report that shows the electricity generation needs to increase by 34TWh (and a capacity of 14.1 GW) of annual generation for the next 26 years, New Zealand needs an equivalent of a Buckleys Road Solar Farm consented and built about every 30 days to keep up with New Zealand's demand of electricity for the next 26 years. If this is not achieved there is not enough electricity to run the country. We need power to keep the lights on, to keep electricity affordable, to heat homes, to keep the economy running, to keep businesses (like farms) running, and to help reach sustainability targets..

7.7 Energy also needs to be affordable for all parts of society and business to thrive. Around the world, record energy prices and people struggling to afford power is being reported, we do not want a situation like that. So it has become more important for New Zealand to be energy independent. An example of this is our imported fossil fuels used in such areas as; transport, industry, farms, milk and food processing, forms of domestic heating and industrial heat will need to be transitioned into electricity, to meet climate goals. and reduce reliance on international markets.

7.8 We will also need to have a better green global image for marketing of New Zealand products. As part of New Zealand electrifying, the demand for more electricity will increase as shown in Paragraph 7.4 as these industries will require electricity while decarbonising. The demand will increase and if the supply cannot meet the demand the price of energy would be expected to go up. This proposal can form part of the solution on keeping energy affordable, and may assist in reducing reliance on fossil fuels and the associated emissions of greenhouse gases.

HIGHLY PRODUCTIVE LAND AND CONTAMINATION

7.9 The matters of impacts on highly productive land and contamination are largely addressed by Kea's expert witnesses. Below I respond to some operational aspects raised in the section 42A report regarding farming practices and potential for contamination.

7.10 From an operational farming perspective, I note that the tracking system allows panels to rotate to steep angles to allow tractors with implements to work amongst the rows, this is part of the intelligent high-tech farming as shown in **Attachment 9**.

7.11 The tractors may be smaller than for traditional operations but the land is still utilised and can be worked, for example if the soil needs to be broken up. We have used smaller tractors on a number of Kea's sites.

7.12 Weed control can be done with spray, as shown tractors can move through the rows, to target weeds if needed. Even on our smaller existing sites we do spot spraying for weeds with backpacks.

7.13 In terms of potential contamination, the panels for this particular site will be crystalline silicon bifacial panels. The piles are to be galvanised steel piles.

7.14 The panel construction encapsulates the material in the solar panel, to stop damage from the weather. A cross section of a panel is shown **Attachment 10**. Also making the panels more robust, the encapsulation is sealed amongst two sheets of glass. Attached below is a letter explaining the construction of solar panels and how they are

encapsulated and sealed from the environment, please refer to **Attachment 10**.

7.15 I have some notes on the safety of panels, health on people and lack of leaching, some examples and much used applications include:

(a) There is over 1TW of solar panels installed on the planet. If these were an issue, countries with strict regulation and standards would not allow the installation of panels.

(b) Panels are on domestic house roofs, less than a meter from people living.

(c) Floating panels on drinking water reservoirs, one example is The Queen Elizabeth II Reservoir in London has floating solar panels on it, the runoff from the panels is straight into the reservoir, this reservoir feeds the drinking water of London! Every year London city carries out more than 500,000 water tests. They take samples from water mains and pipes, as well as from customers' taps. If the panels were poisoning the water, the panels would be removed. Please refer to **Attachment 8**.

(d) There are many irrigation ponds around the world with floating panels feeding irrigation water onto food crops.

(e) Schools and hospitals have solar panels on them all of these are examples of how safe solar panels are.

(f) Organic farms being built under and around solar farms. A perfect example in New Zealand is Kea's Wairau Valley Solar Farm which is surrounded by an Organic Farm that is in the process of getting it's organic certificate. There is an opportunity for the farms next door to the Buckleys road solar farm to look at going organic. With the Wairau Site as an example it shows that the solar farm will not limit their opportunity of going organic with examples in New Zealand and around the world.

7.16 When a panel is damaged we remove this panel, and replace it. The damaged panel is recycled as e-waste the aluminium and glass is separated, and the other material is extracted. The typical warranty of a solar panel is between 30-35 years. There are known solar panel plants that have been operating for over 60 years.

7.17 The solar panels we use have a fire class of A according to UL790, Class A is the greatest resistance to flames spreading. The inverters we use comply with IEC 62271-212 this standard refers to fire containment. On top of this we are irrigating part of the site and vegetation management will take place to help control any fire. As addressed by Ms Kelly's evidence, a fire plan will be provided.

7.18 Our panel supplier will be a mainstream supplier, which will comply with all NZ requirements and standards.

EMPLOYMENT OPPORTUNITIES

7.19 The submitters have raised concerns about the solar farm reducing employment opportunities. The proposal will create a wide range of job prospects, after and during construction and during operation, other than the employers who would visit the site, there will be contracting jobs on site. These could include but certainly are not limited to:

(a) The farmers 1-2 FTE.

(b) The plant/ground maintenance team 2 FTE.

(c) The New Zealand inverter supplier service contract (26 days a year)

(d) Fault team 2 FTE

7.20 Other jobs which may be created and require people to be employed by KeaX as a direct result of the solar farm, include jobs like but not limited to:

(a) Energy sales officers 3 FTE's

(b) Sales/Account Manager 1 FTE

(c) SCADA/NMS Control room 1 FTE

(d) Call centre 2 FTE's

(e) Call centre Manager 1 FTE

(f) Energy trader 1 FTE

(g) General Manager 1 FTE

8 CONSULTATION WITH THE COMMUNITY

8.1 I spoke with the Wards at the conception of the project on 18th May 2021 and they were keen to be part of it. Matthew Ward went around and spoke to his neighbours. Some of these neighbours including the Kewishs and the Caseys wanted to know more, and asked to meet me.

8.2 Myself and Naomi had a meeting with Anneka and Micheal Dalleys on 30th July 2021 to discuss ideas and land parcels on the Brookside solar farm. We discussed the neighbouring solar farm and the possibility of leasing their land, we could not reach a satisfactory agreement with them.

8.3 I met with the Casey's on the 20th July 2021 with Angela Ward, and had another follow up meeting on the 4th February 2022.

8.4 I also met with the Kewishs on the 3rd March 2022, when we explained about the project and answered their questions.

8.5 I met with the Greens on the 4th November 2022, and had a discussion with them on the solar farm.

8.6 Since the proposal was limited notified, I have had meetings with members of the community when they called, including people who were not identified as potentially adversely affected. I addressed the matters which they were concerned about, and since have given further evidence to help them understand their concerns.

8.7 A number of neighbourhood meetings have been held to discuss the solar farm in Brookside. Kea was not invited nor was it given the opportunity to talk at any of them, however feedback was passed onto the Council, which they passed on to Kea.

8.8 Kea reached out to affected parties via email and/or mail on December 5th 2023, please see the email in **Attachment 7** stating that we are interested in hearing their concerns, questions and opinions. No submitters responded, or wanted consultation.

8.9 The Proposal has also been amended to address concerns raised by submitter's through the Council as follows:

(a) Lower average height profile by moving to a tracking system,

(b) Inverter equipment more central and situated in the middle of the land.

(c) Faster growing trees for screening. Already there is substantial screening around the site (in the region of 85% are already over 3M in height) as shown by Ms Anthony.

(d) Larger average area around the boundary of the site.

8.10 Further consultation was offered after submissions were received, and more detailed emails and letters were sent out on the 24th January 2024. We have not received any response from submitters except from the Dalleys trustee mentioning that he had received it. No consultation was taken up by the submitters.

8.11 Please see table below on consultation.

Date	Whom	Type
18/05/2021	Wards	House Visit
30/07/2021	Dalleys	House Visit
20/07/2021	Casey's	House Visit
4/02/2022	Casey's	House Visit
3/03/2022	Kewishs	House Visit
4/11/2022	Greens	House Visit
5/12/2023	All Submitters	Email/Letter
24/01/2024	4 x Submitters	Email/Letter

9 CONCLUSION

9.1 In conclusion, I consider that the proposal will contribute both local and national benefits including:

(a) supporting local employment and the local economy. By assisting with the diversification of land use and farming. Farming (Primary Production) is still taking place on the land, but at an intelligent, high tech level, it is embracing technology.

(b) the efficient use of existing infrastructure by locating the proposal on a site that has existing access to existing transmission infrastructure.

(c) contributing to the generation of affordable renewable energy and this is supported by the NPS-REG. Which is to help assist with New Zealand de-carbonising its economy and reduce New Zealands GHG.

(d) helping NZ power supply keep up with demand, and helping with resilience for the region and local community.

(e) This solar farm is the perfect neighbour, all effects are shown to be minor or less. Quiet sound, visually screened, no smells/odours, minimal traffic, no animals crossing the road, no chicken farms waking you up.

Keeping the lights on, and advancing New Zealand's farming industry. This is a solution to many problems.

Campbell McMath

16 February 2024

Attachment 1: Orion AMP Maps of anticipated expenditure and network constraints.

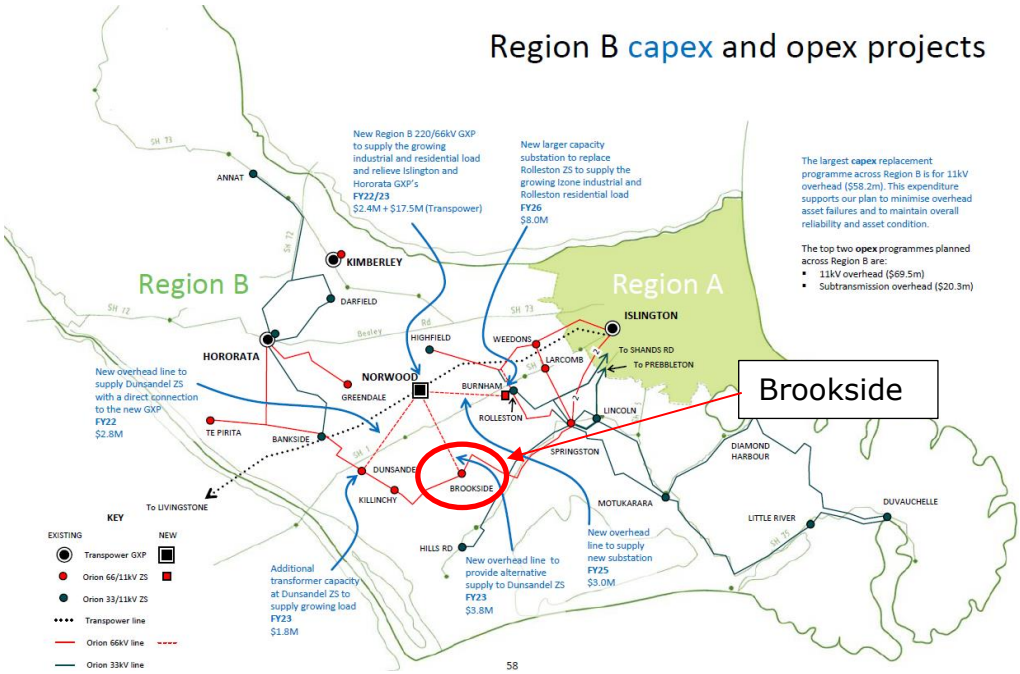
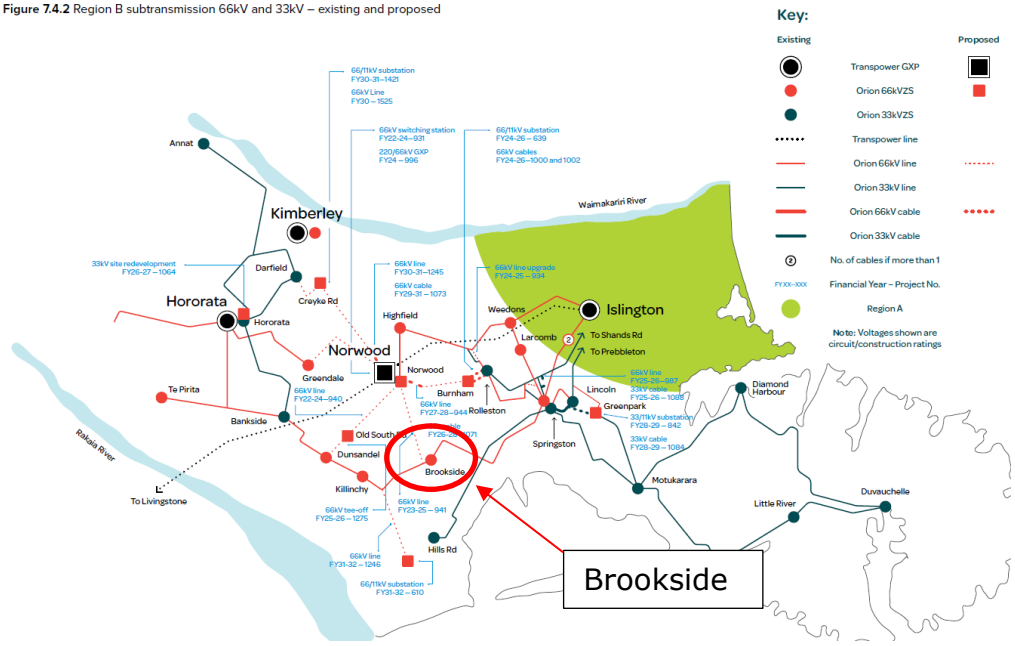


Figure 7.4.2 Region B subtransmission 66kV and 33kV – existing and proposed



https://www.oriongroup.co.nz/assets/Uploads/FY19-maps-of-anticipated-expenditure-and-network.pdf

https://www.oriongroup.co.nz/corporate/corporate-publications/annual-reports/

Link to Orion AMP's, this shows where network growth and spend is going.

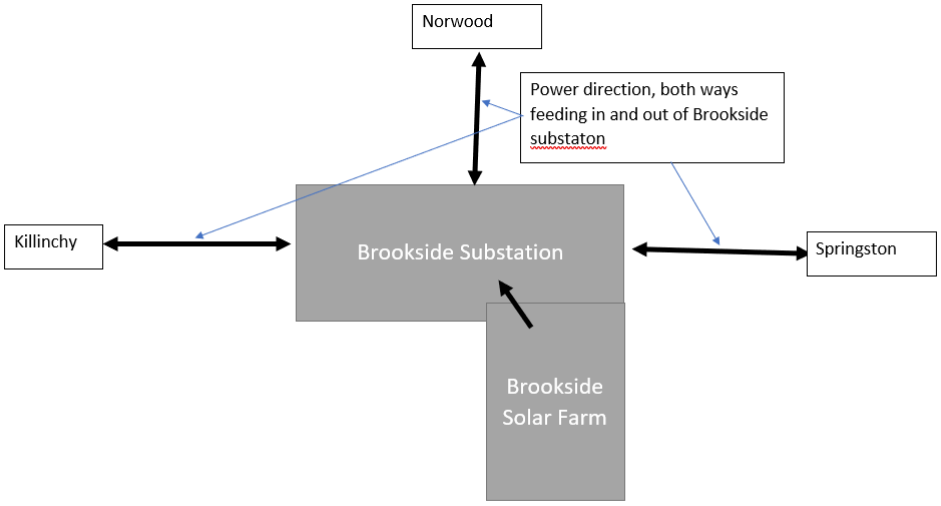
https://www.oriongroup.co.nz/corporate/corporate/publications/asset-management-plans/

https://www.haveyoursay.oriongroup.co.nz/norwood-grid-exit-point/widgets/375936/faqs#91170

Cost of Norwood $58M

Attachment 2: Operational High Level Map

Please see below for an idea of the connectivity of the solar farm into the network.



Attachment 3: Dairy NZ link to staff shortages.

https://www.dairynz.co.nz/news/international-workers-will-help-address-dairy-staff-shortage/

Sustained advocacy from the dairy sector has helped secure 500 more international workers to help on dairy farms, however, the Government's border class exceptions still fall short of the sector's 4,000 worker shortage.

DairyNZ is relieved the Government is allowing an extra 500 international dairy workers into the country through a border class exception. This means 800 international staff will be able to enter New Zealand to work on dairy farms.

DairyNZ chief executive Dr Tim Mackle says DairyNZ has been working hard to make sure the Government understands the huge pressure farmers are under, due to workforce shortages.

The organisation has pushed for 1500 international dairy workers into the country in time for the 2022 dairy season on 1 June.

"We made it clear to Government that the 300 dairy border class exception workers previously approved was nowhere near enough to meet the demands on-farm and reduce the current high levels of farmer stress," says Dr Mackle.

"The Government's decision to increase the number of international workers by 500 is a step in the right direction to reduce the pressure on farm teams. We will continue to advocate for more to be allowed into New Zealand, to help address the significant staff shortage."

The dairy sector is estimated to have a shortage of 4000 workers. Record low unemployment, combined with a prolonged border closure, have contributed to the shortage of workers.

DairyNZ has also launched a 'Join Us' campaign aiming to connect dairy farmers and New Zealanders and inviting Kiwis to join a dairy job – see www.godairy.co.nz for more detail.

"We continue to encourage Kiwis to join our sector and farmers have been taking a range of steps to make dairy farming more attractive to staff, however in such a tight labour market the contribution international staff make to keep farms running is critical," says Dr Mackle.

"From here, we strongly encourage farmers who want international workers on board for calving to apply through the border exception process.

"It's now simpler for farmers to use the class exception process, so we hope to see farmers take up the opportunity. People no longer need to stay in MIQ or isolate. There is also no limit on the number of farm assistants who can apply."

Workers on a class exception visa need to be paid at least $28 per hour.

(f) *Background*

The recent changes announced by the Government will increase the number of international workers allowed into New Zealand under the 2022 dairy class exception from 300 to 800.

This is in addition to the 2021 dairy class exception visa which allowed 200 international workers to enter the country.

Employers must apply to DairyNZ for nomination and have a class exception visa granted by Immigration New Zealand.

A limited number of dairy workers may be eligible to enter New Zealand under other criteria – for more details see www.dairynz.co.nz/border. Information on the changes to the border class exception will also soon be available at this web address.

Attachment 4: Solar farm trial shows improved fleece on merino sheep farmed under panels

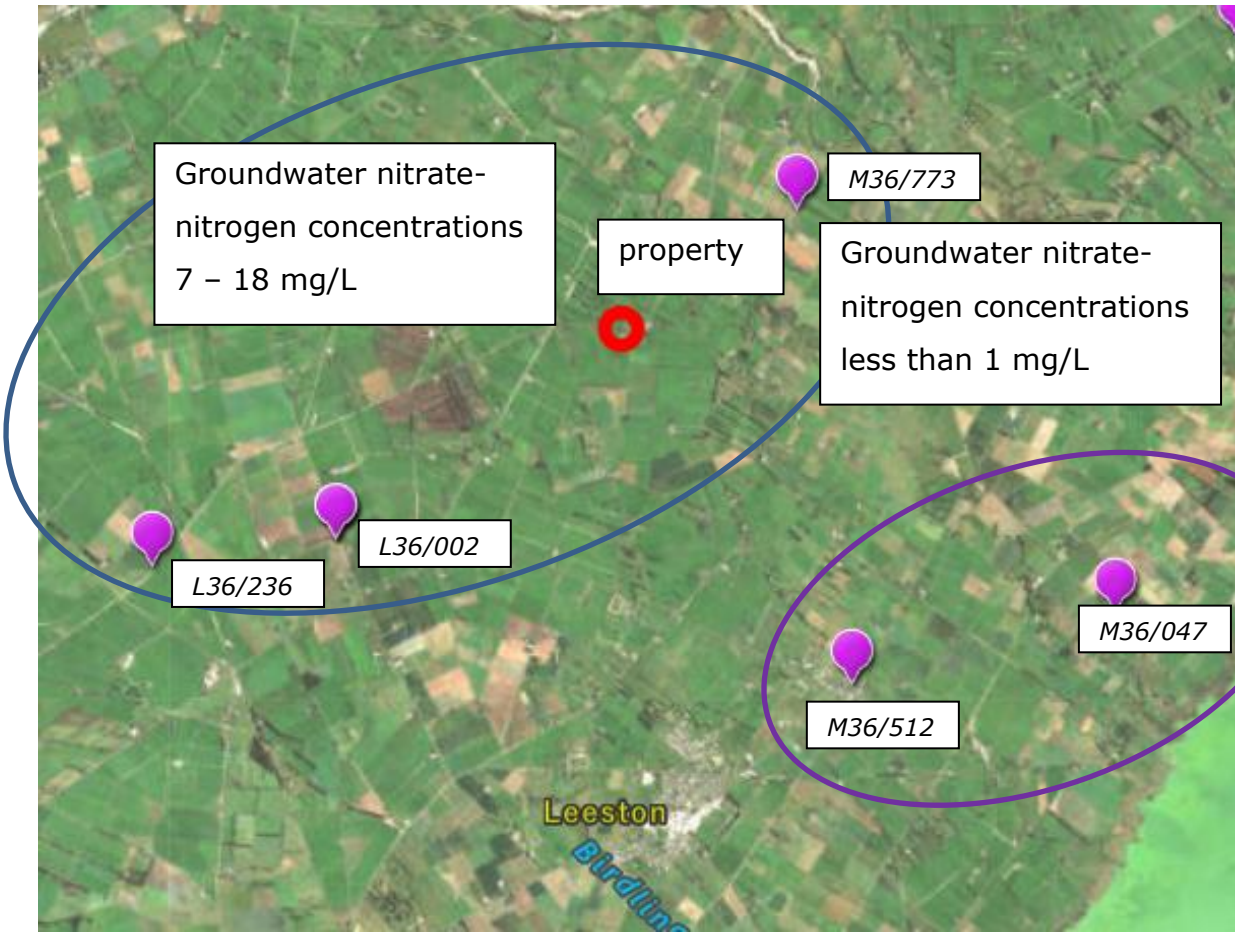
https://www.abc.net.au/news/rural/2022-05-30/solar-farm-grazing-sheep-agriculture-renewable-energy-review/101097364

https://interestingengineering.com/innovation/grazing-sheep-solar-panels-wool-quality

Attachment 5: ECan nitrate report.

Enquiry nitrate-nitrogen concentrations in groundwater in area around 115 Buckleys Road Leeston

Current nitrate nitrogen concentrations (see map)



L36/0224: Likely increasing nitrate concentrations over last decade
M36/7734: Very likely increasing nitrate concentrations over last decade
M36/0473: Very likely increasing nitrate concentrations over last decade

Interpretation

Nitrate-nitrogen concentrations near the farm on 115 Buckleys Road are relatively high and (very) likely increasing based on groundwater quality in our wells database. Chapter 11.7.3 of the LWRP sets out water quality limits and targets for the Selwyn Region. The target for nitrate-nitrogen in groundwater is 8.5 mg/L (5 year annual average). Our data shows concentrations are higher than this in the area of the property. Groundwater in the Selwyn Region feeds into streams and springs that

eventually enter Te Waihora/Lake Ellesmere. In Plan Change 1 of the LWRP it was recognised that actions were required to prevent further degradation of the water quality and quantity in the Region by ***stricter management of water takes and nitrate leaching from farms***. The supporting documents that clarify these ambitions can be found here: https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-land-and-water-regional-plan/change-1-selwyn-waihora/ , under Public Notification and Supporting Documents. A summary can be found in this information sheet (page 2).

Attachment 6: New Zealand's growth

Total area for New Zealand's growth at 2GW (does not include converting existing non-renewables) constant load (approx. 30% growth)
2GW constant load is 17,520 GWH per year
New Zealand needs 12,514 MW of solar installed, if just solar
Land at .75MW per Ha is around 16,686 Ha. Recall this can still be used as farmland.
https://www.stats.govt.nz/indicators/land-fragmentation
NZ total HPL land in 2019 is 3,498,438
If just the HPL was used for solar (i.e. no rooftops, or non-hpl) total land area would be 0.48%, recall this land can still be used for farming.
New Zealand total land area is 26,331,000 Ha if all was solar would be 19,748 GW solar Farm.
World energy demand in 2019 is 22848 TWH this would need a 16.32 TW solar farm.
If New Zealand was one big solar farm it would generate more electricity than the world uses.

Other notes

- Embedded generation is different from traditional centralised power stations which are built near their fuel source, i.e. Dams near rivers, wind turbines near hills, solar is unique as can be built near the load.
- Ground mount solar farm
- AF8
  - and a 82% chance it will be a magnitude 8+ event. A magnitude 8 earthquake is around 350 times more energy then the 6.3 Christchurch earthquake.
  - "*Electricity supplies throughout the South Island will be affected with likely blackouts within at least 150 km of the Alpine Fault*"
  - Christchurch is within 150kM of the alpine fault.
  - 33kV Cable joints would need to be done, each is expensive.
  - Increase risk of failure as crossing different land parcels and longer distance.

Bees

- Becoming common practice to put beehives on solar farms, which suggests that bees and solar farms work well, just to name a couple of sites.
  - Enel sites in the USA and Spain 100MW+ sites have bee hives

    - Engie Green (France) beehives at some of their solar parks in south of France The company's distributed solar group also has ongoing solar beekeeping projects in Minnesota and Vermont
    - EDF Renewables (Canada) 2 MW Arnprior Solar Project came online in 2009 home to honey bee hives.
- Having conversations with local beekeeper. Discussions suggest there is enough bees in the area, and have sent a list of pro-bee plants, Kea has sent to the landscape planner.

Electricity modelling is done for one site rather than many. Modelling

An example is the concern over bee life, it was pointed out that there is a potential for bee hives on the solar farm as done in Europe and the States.

Attachment 7: Record of Consultation

Email/Letter sent to submitters.
From: Campbell McMath <campbell@keaenergy.nz>
Sent: Tuesday, December 5, 2023 10:48 AM
To: haurere@farmside.co.nz
Subject: Buckleys Road Solar Farm

Hello Dalleys,

As you may be aware Kea, with support from Ethical Power NZ Developments Ltd, is proposing to establish a solar farm in your neighbourhood. We are currently seeking resource consents to enable the solar farm, which is a revised proposal from what was previously applied for in 2022.

The solar farm is intended to help New Zealand achieve its goals of carbon zero, reduce green houses gases, help keep power affordable, diversify income for Selwyn, improve the environment and many other benefits. A further FAQ sheet has been attached.

Please see this link for the application documents for the revised proposal submitted to Selwyn District Council:
https://www.selwyn.govt.nz/property-And-building/resource-consent/limited-notified-resource-consents

The application is now at the limited notification stage.

We understand that proposals of this scale, and with relatively new technology (for New Zealand), may cause concerns. We also acknowledge the concerns previously raised and note that we have tried to address these in this revised application.

We would be interested to hear your concerns, questions and opinions on the revised proposal. You will be familiar with the Kea team (myself). We also introduce Ethical Power NZ Development Ltd, led by Nick Keeler in New Zealand.
Please reply to admin@keaenergy.nz, or call us on 03 390 0009 to discuss.
Have a sunny day.
Regards

Campbell McMath

☎ +64 3 390 0009 (Ph) | ☎ +64 21 151 0583 (Mobile) | www.keaenergy.nz

KeaX Ltd
PO Box 38,
Leeston, 7632, Canterbury,
New Zealand

Please see table below on consultation timetable.

Date	Whom	Type
18/05/2021	Wards	House Visit
30/07/2021	Dalleys	House Visit
20/07/2021	Casey's	House Visit
4/02/2022	Casey's	House Visit
3/03/2022	Kewishs	House Visit
4/11/2022	Greens	House Visit
5/12/2023	All Submitters	Email/Letter
24/01/2024	All Submitters	Email/Letter

Attachment 8: QE2 reservoir

Queen Elizabeth II Reservoir - Courtesy of Barhale & Thames Water

https://www.thameswater.co.uk/help/water-quality

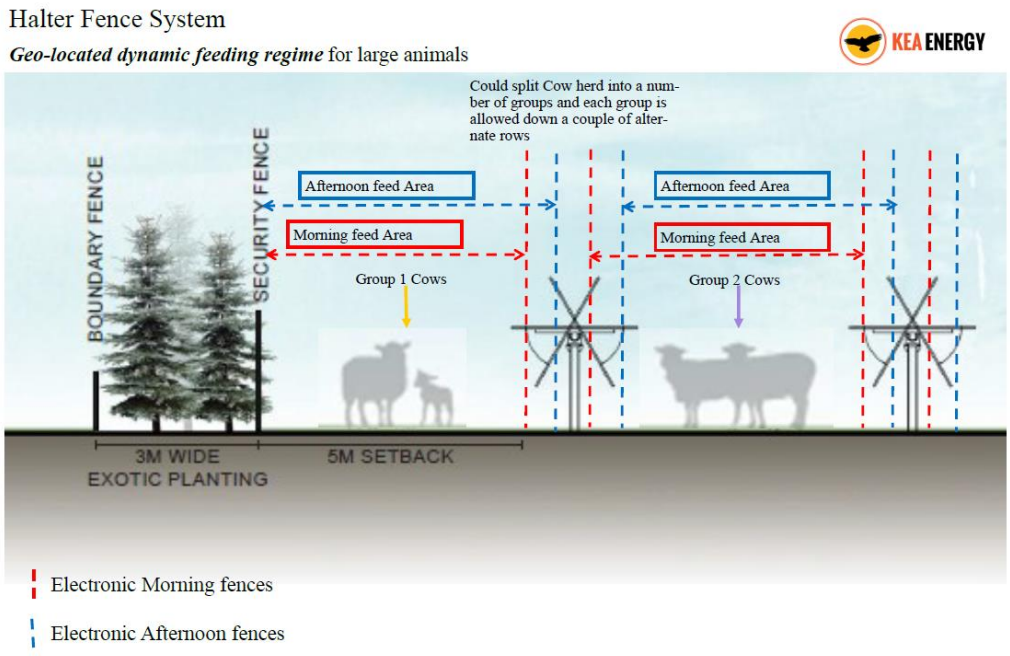
Drinking water in London

Every year more than 500,000 tests. Samples from the water mains and pipes, as well as from customers' taps

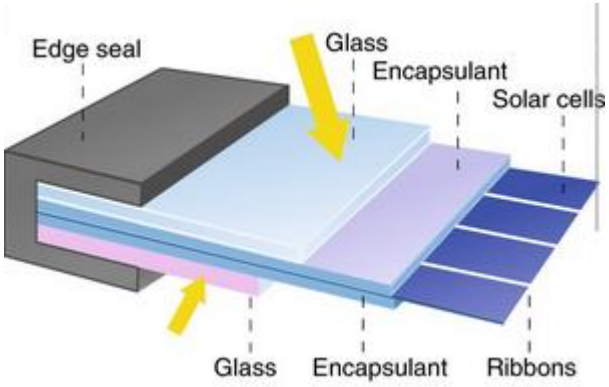
Attachment 9: Production Equipment

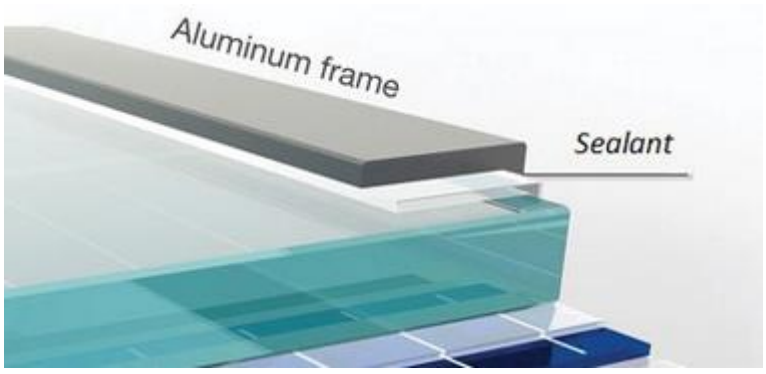
Examples of tractors and farming on solar farms:

Geo-located dynamic feeding regime using Halter.



Attachment 10: Panel construction





Letter form solar panel supplier on construction of panels.

Yingli Energy Development Co., Ltd.
No. 2599, Xiangyang North Street, gaoxin Zone,
Baoding City, Hebei +86 031 2892 9996

Dec 12th, 2022

Mr Campbell McMath
Kea Energy Ltd
PO Box 38,
Leeston, 7632, Canterbury, New Zealand
+64 3 390 0009 (Ph)
www.keaenergy.nz

PRODUCT ENCAPSULATION AND LEAKAGE STATEMENT

Yingli Solar panel Series YLxxxDF72e/2 (xxx=Pmax), YLxxxCF72 e/2 (xxx=Pmax), YLxxxCF78 e/2 (xxx=Pmax).

Introduction:

Yingli Energy Development Limited, known as "Yingli Solar", is one of the world`s leading solar module manufacturers. A technical statement about the solar panel water tight encapsulation and mechanical strength is provided here. With high quality encapsulation materials and strengthened double structure, Yingli solar panels have proven, with over two decades of field installations around the world, to be highly reliable and well suited to harsh environments.

Description:

In the real environment (field), the solid state silicon cell is encapsulated (sealed in) by a POE, Polyolefin material that is used in the Yingli 'Bifacial' solar panels. This solid encapsulation acts as a moisture barrier that has corrosion inhibiting properties to support stability to a higher standard than EVA, ethylene vinyl acetate, encapsulation materials that is used typically in other solar panels. The POE is then sandwiched (bonded) between two glass sheets and the perimeter of the glass sheets are framed within a solid Aluminium extrusion. Once this process is finalised and the solar panel construction is complete, the main elements exposed to the environment are glass and aluminium. This would be similar to a common aluminium window or door.

Should the glass surface crack, then the silicon cells remain encased in the POE material and the faulty module can be visually identified and replaced. There are a number of other ways that a faulty panel can be identified :

An electrical earth fault would trigger a warning to the inverter, and that faulty panel can be isolated within the solar array followed by,

- A visual site inspection, either done manually or with a drone (EL or IR imagery), to identify the cracked module within the isolated PV array and that panel can be replaced.
- An appropriate system design for the specific site conditions should align with a comprehensive Operational and Maintenance (O&M) program to maintain optimal system performance and electrical safety.

An appropriate system design for the specific site conditions should align with a comprehensive Operational and Maintenance (O&M) program to maintain optimal system performance and electrical safety.

Your sincerely,