Campbell McMath – Kea Limited

Key points
Discussion topics at hearing (Brookside Solar Farm)

Introduction

- My background was a control system engineer where most of my work pre-Kea was with Orion around the 2000's.
- Who is the Kea group? Kea Group est 2009 local company, only gentailer with a head-office in Selwyn.
- Kea's roots started from a family dairy farm
    - 400kW run of the river hydro moved into Retailing and then moved into Solar some 10 years ago, in perspective this was the beginning of the solar industry in New Zealand.
- Kea's latest feather in the cap is building NZ largest and first utility scale solar farm in Jan 2021. We have experience and have done this.
- Brookside Project and NZ need
    - Around 160MW
    - Around 22,000 houses worth of power for entire year. Selwyn total houses in the 2018 census is 23,244 houses.
    - At 103g/kWh (16/2/2023) (a little below average) Brookside project will be offsetting 21,630 tons of CO2 per year helping the NPS REG achieve its goal.
    - Located around 258Ha of dairy farms
    - Total area of land used by solar on the site is approximately 2022 sqM 0.078% (approximately 1 x 50 bail rotary cowshed and yard size) still leaving about 99.92% of the land available to be farmed.
    - Waitaki power station has a capacity of 105MW (slightly smaller capacity then the solar farm) and has a manmade lake around the size of 442 Ha. (4,420,000 m2)
    - Likely/Common scenario Orions summer load on typical summer day around 400MW, when the Brookside project is generating 100MW, it will be supplying 25% of Orions power from the solar farm, delivering 100% renewable generation.
    - Embedded in distribution network and reduces transmission losses the Brookside project does not need to transmit the power through the transmission lines, it is where the power is needed, having generation next to load. Not just power but GHG reduction, shown in evidence 5.11 statement from Transpower "*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*"
    - Transpower study states "*60-80% increase in electricity demand by 2050*"

- Orion AMP states "*Winter peak demand on our network is anticipated to increase by approximately 114MW (18%) over the next 10 years*"
- Orion load increase by 2050 expected to increase from around 630 X 1.7 to 1071MW an increase of 371MW.
- Helping make power affordable for all. It would be logical to assume that an increase in supply of power will result in a lower market price, making power more competitive. This is shown in Kea Energy power prices, and companies wanting to join Kea.

(Part of) Operational need.

- Can't underplay the important of resilience is the ability for a network to get through a fault, disaster, accident, and maintenance, to be flexible. In short keeping the lights on.
- 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.
- Resilience (source https://af8.org.nz/)
  - 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.
  - ***The South Island electricity generation and distribution network will be severely compromised*** *"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.* **Key Point Here** *Some local generation and distribution is anticipated to be achieved in less severely affected later in the first week of response"*
  - Seen this in Hawkes Bay, with cyclone Gabrielle.
    - 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*"
    - 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"*
    - 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.*

        - The Brookside project is part of the local generation, and the closer generation is to load centres the better (less then 30kM). Also shown in our evidence 5.10 the solar farm has 3 circuits feeding the 66kV substation.
        - It is needed and needed now. The Brookside project is improving resilience in the network and helping with the demand increase (60-80% more power needed). keeping the lights on

Site selection Operational need (bring map)

- Why is it where it is. In simple "*Brookside substation*"
- Orion 66kV rural network, big power lines not big-big
    - Capacity on line.
    - Capacity at substation
    - Resilience is essential. 3 lines feed Brookside.
- Importance of being at substation, existing equipment gross underutilisation if not used. Better not just for economics but the environment.
- N-1 importance explain, resilience,
- Requires large flat land area needed with good ground conditions.
- Land owner wanting to lease or sell at an agreed rate.
- Helping NZ meeting NPS -REG targets.
- Reason for large scale
    - Economics
        - Economics of scale.
        - Large purchasing power of equipment.
        - Equipment can be economically maximised i.e. sharing a large transformer is cheaper then lots of single transformers of the same total MVA rating (40MVA example), switchgear (explain house CB 16A and 32A) is a similar principle.
        - Existing cable and transformer efficiency.
        - Investment certainty is needed.
            - Project needs to be Economic
            - Fixed costs to cover.
            - Minimum size is needed.
- Submitters Planners suggestions is helpful illustrating some of the reasons.
    - Dunsandel
        - No Capacity already has a solar farm assigned. (have checked this is public)
    - Te Pirita at the end of a 66kV line (DOG),
        - capacity limited around a 1/3rd of what Kea need.
        - Only one line (risky), resilience is low (too high risk for us), no N-1, too much economic risk.
    - Brookside Non-HPL just some of the following reasons why.

- Non HPL submitters say 3.1km to edge of site. The distance is getting to far for the HV (33kV) cables needed i.e. the cables would need to be larger to travel that distance, would be uneconomic to cable.
- 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
- Extra capital expenditure on HV (33kV) cables, it is not a cheap cable.
- Wasted Cu /Al, which is not environmentally friendly, simply not in our DNA to waist resources, Kea want to maximise utilisation.
- 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).
- Recall amount of energy being transported 110MW, Orion summer load typically 400MW on a typical summer day around 25% of Orion's power will be from the solar farm.
- There is increase losses / wasted energy by traveling longer distances.
- Would still need to secure the land. Land is not guaranteed.

Small Scale Impact touched on this before.

- piles are hit straight into ground no pre-drilling no earthworks for piling needed, minimising the footprint.
- Opposed to concrete blocks
- Once site is complete gravel access road can become over grown allowing for more grass.
- The land area for available farming is minimally affected. About 99% available

Farming continuing

- Coined "Agri-Voltaic" explained in evidence in 6.2 from MFAT defined in simple "*The land use of both agriculture and solar PV*" MFAT (ministry Foreign Affairs and Trade).
- I believe R and D needs to be developed in Agri-voltaic to stay in the game.
- Discussions with Lincoln Uni doing something similar, with their purposed solar farm.
- White paper on sheep trials are showing improved fleece on sheep farmed in conjunction with solar farms.
- Kea are expecting a higher quality product from the land.
- Area still being used as primary production, and as mentioned in our AEE **irrigation is still taking place on the land**. Kea are expecting to increase flock size as irrigation takes hold. Recall still 99.92% of the land is still available for farming.
- Large gaps between rows allowing sun and rain to pour in between rows and around panels.
- Thinkwater discussing on irrigation plans.
- Federated Farmers President Andrew Hoggard comments on solar farms "*They seem to be focusing their interest around areas that border existing substations or other keys bits of infrastructure to minimise costs of transmission, so it's likely they'll be*

fairly targeted, not a blanket approach" and the article mentions *"Federated Farmers President Andrew Hoggard is relaxed about the prospect of large-scale solar farms."* Evidence 8.13

- Kea are happy with the amount of dry matter being farmed from under and around the panels, the ground receives enough sun and water for what Kea needs,
- The boundary plant maintenance will be contracted to Ventia and/or Fowler, both are experienced in vegetation around infrastructure.

Water quality

- Nitrates in evidence in section 8.10 ECAN interpretation and statement.
    - "*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*"
- As the Brookside project does not have the need for nitrogen, it would be logical to assume if less nitrogen is put on the land there would be less nitrogen in the groundwater feeding the streams. Helping clean our streams and lakes.
- Our farming method is more sustainable, less intense and aligning to ECAN and the NPS-FW.

Community consultation

- Originally contacted local councillors in August 2021, all assisted and were positive.
- Consultation with neighbours evidence 6.9
    - Ward went round to talk to some neighbours.
    - Meeting with multiple people shown in approvals for project.
    - Caseys July '21
    - Kewishs Mach '22
- Other groups or people since notification then always answered their concerns and offered to meet anyone who wanted to, including unaffected parties who .
- Discussion with bee keepers, on bee friendly plants and potential for bee hives on the solar farm as done in Europe and the States.

Employment

- There are jobs on the farm and off the farm evidence 6.13 and 6.14 shows post construction approx. 5 FTE on site and 10 FTE off site call centres, sales, Control room, manager, trader. Remember 23,000 houses of power.
- Since then, Kea have had several meetings discussing the project with councillors and the feeling continued that they were very positive and supportive.

Benefits / Summary

The community Kea and I am part of has community Pride:

The Brookside project:

- is trying to reduce nitrates to help our rivers and streams
- is contributing towards decarbonisation.

- Is helping power be affordable.
- is reducing GHG.
- is diversified.
- Is helping NZ power supply keep up with demand.
- embraces technology.
- is resilient for the region and local community. Keeping the lights on

NPS Goals

- Likely to improve water quality –NPS FW
- Area still being used for primary production –NPS HPL
- Much needed REG – NPS REG

This is a solution to many problem

Thank you SDC, Submitters, and the public for your time.