



RMCG

Asia-Pacific Solar Research Conference

“Solar farms and conflict with prime agricultural land”

Solar farms impact on “strategically important land” and GMID irrigation system.

PRESENTED BY Rob Rendell

based on a Study undertaken for City of Greater Shepparton

6th December 2023

Solar farms in Regional Victoria fall within a number of strategic plans

Regional, State and National alignment

The collage features five strategic plan covers:

- Hume Regional Climate Change Adaptation Strategy** (November 2021): Features a colorful landscape with yellow, orange, and green hills under a blue sky.
- Goulburn Murray Resilience Strategy** (2020): Features a close-up of pink cherry blossoms on a tree branch.
- Goulburn Broken Climate Change Adaptation Plan**: Features a collage of photos showing people in a meeting and outdoors in a natural setting.
- Water Cycle Climate Change Adaptation Action Plan 2022-2026**: Features a close-up of a hand holding a pink irrigation pipe.
- VICTORIA'S CLIMATE CHANGE STRATEGY**: Features a landscape with wind turbines and a green field.

Greater Shepparton logo is visible in the top right corner of the collage.

Talking about solar farms each covering from 40ha to 1,000ha
or up to 3km by 3km

Large Scale Solar Farms



Solar Energy Facilities

Design and Development Guideline
August 2019



Solar Energy Facilities

Design and Development Guideline
October 2022



The Government has issued guidelines and has specific planning rules.

Except the rules keep changing

What do the guidelines say?

two key bits - strategic land and irrigation infrastructure

In August 2019 they said

*“A solar energy facility should not lead to the loss of productive, state-significant agricultural land” ...
”and must consider the impact of the proposal on strategically important agricultural land,
particularly within a declared irrigation district”*

In October 2022 they said

Avoiding strategically important agricultural land

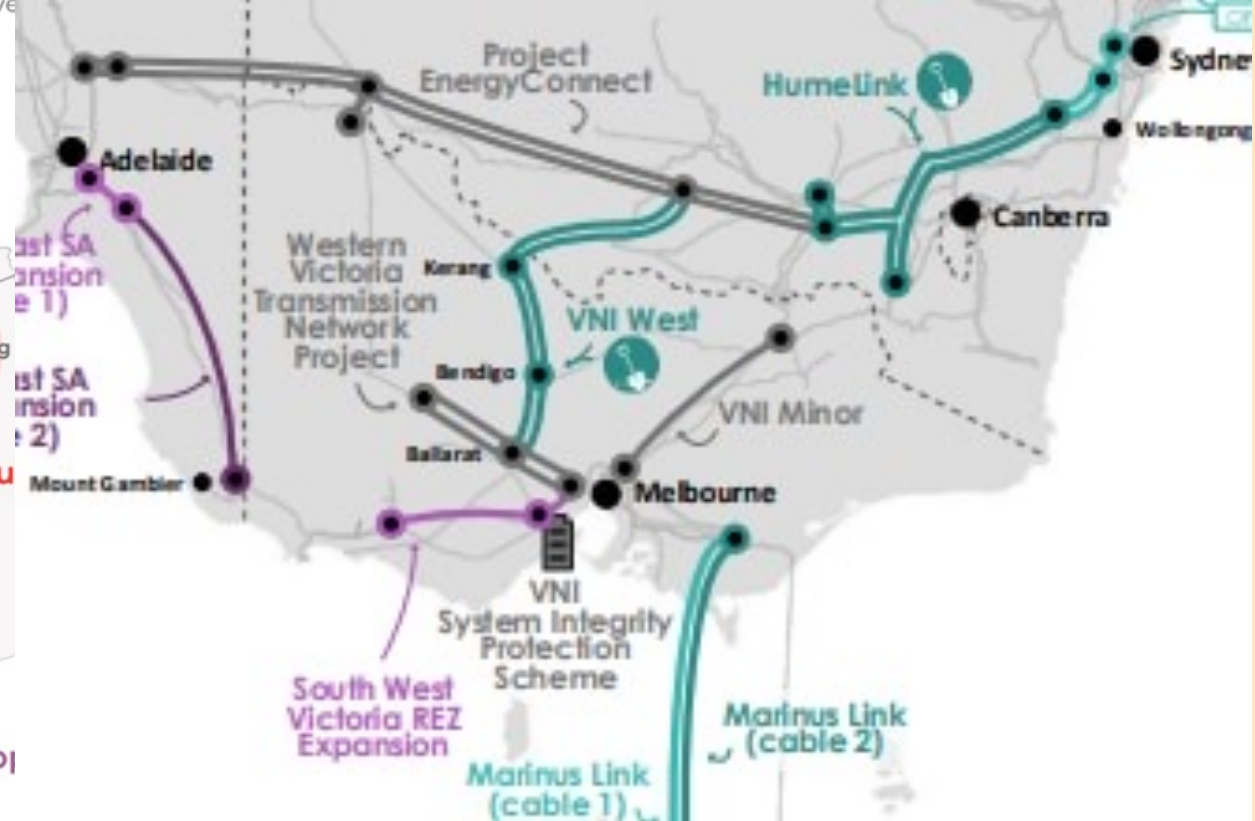
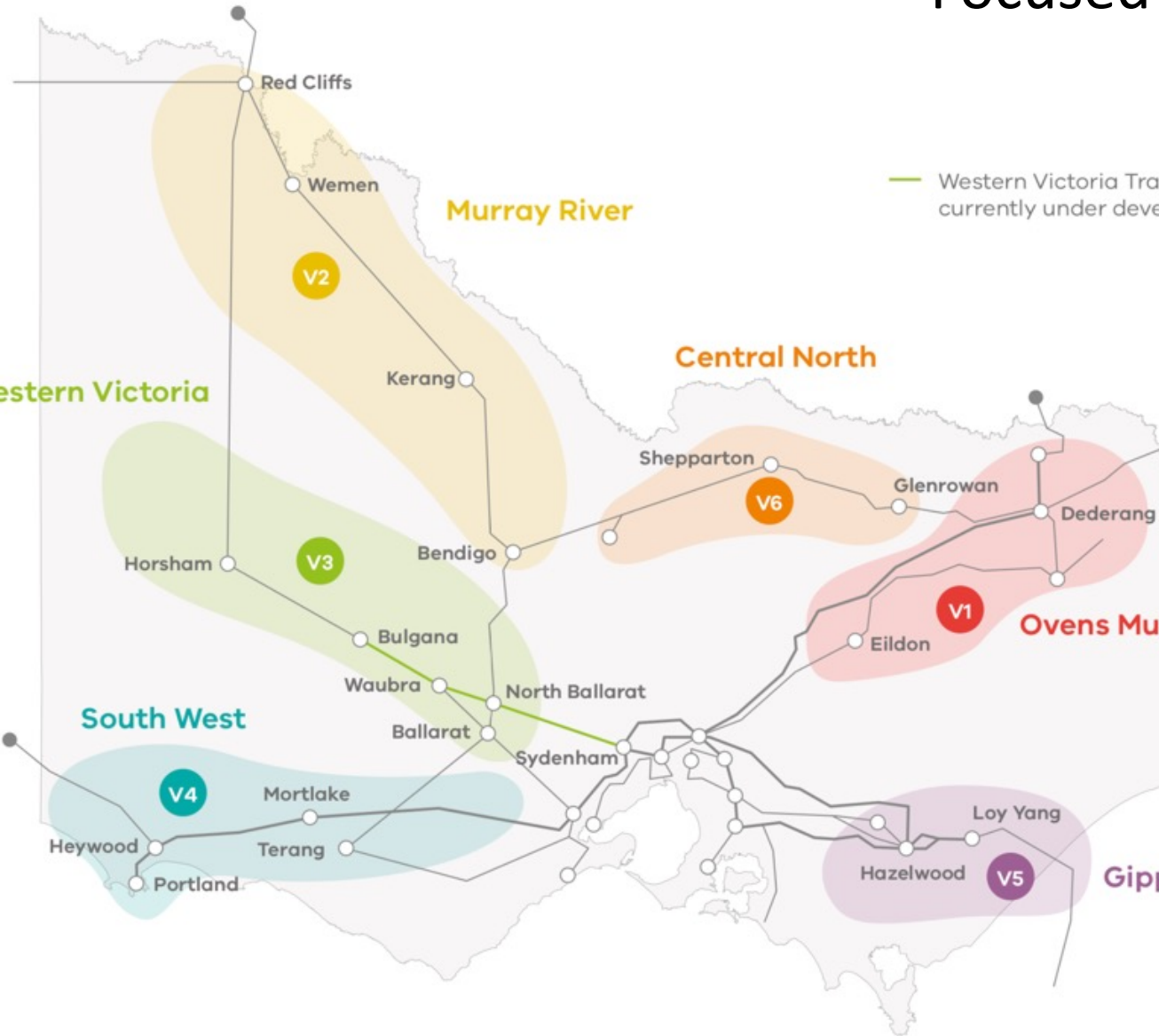
Agricultural land may be considered to be high-value and strategically important due to a combination of features such as high-quality soils, good rainfall, access to water, resilience to climate change, infrastructure investment and integration with industry.

Avoiding land serviced by irrigation infrastructure

The Victorian Government’s policy on protection of declared irrigation districts, as reflected in the planning framework, is to protect agricultural land serviced by irrigation infrastructure to ensure the future viability of an irrigation district.

Figure 1 Victoria's Renewable Energy Zones

Focused on V6



History of Solar Farms to 2022 in northern Victoria irrigation region (V6)

There have been 903MW approved in Shepparton region – approx. 2ha per MW – about 2,000ha (another 1,000ha have applied)

Obtaining approval has been an arduous task – involved several VCAT hearings.

The first VCAT hearing was a Panel hearing in May 2018 which recommended approval of all 4 applications. Neighbours and DELWP vigorously opposed! This rejected the logic within the initial DELWP draft guidelines.

Then DELWP changed the rules - Sept 2019 planning scheme amendment VC161 specified that Minister for Planning is the responsible authority and must listen to DELWP advice.

DELWP then issued “Solar Energy Guidelines” 2019 to support the siting, design and assessment of large scale solar energy facilities in Victoria.

The 2019 guidelines focus on the need to protect ‘strategically significant agricultural land’ and to not adversely impact the GMID modernized supply system.

These 2019 guidelines were tested and VCAT ruling of 11th Feb 2022 again approved the application despite the Minister rejecting the application based on DELWP’s advice.

No one was happy with DELWP (DEECA) opposing and VCAT over-ruling.

City of Greater Shepparton engaged RMCG to look at the issues and provide a discussion paper with a way forward.

RMCG

5 JULY 2022 |

Renewable energy and Conflict with Prime agricultural Land – discussion paper.

Land and water use data analysis – GMID with a focus on Eastern part (Campaspe, Moira and GSCC Municipalities and Shepparton, Central Goulburn and Murray Valley irrigation districts)

Started by examining the likely extent of Solar Farms in the Shepparton region

Engaged “Sustainable Energy Transformation” to determine the likely potential solar farms in the area.
There is a separate report.

He found that:

- *Shepparton regions current demand is 1200ha and future is 4,000ha on average, BUT to meet winter demand then double this to 2,400 currently and 8,000ha ultimately*
- *Likely contribution to Victoria is limited by **export capacity** to 800MW or 1600ha on average*
- *AEMO’s proposed short term upgrade limits solar energy in wider region 2,500MW or 5,000ha with export capacity of 800MW (1600ha). **By 2050** only a further 1,700MW or 3,400ha is proposed. ie max total of 8,400ha*

The likely area of solar Farms in Shepparton region

Somewhere between

3,000ha to 4,000ha immediate future

And by 2050 up to

8,000ha maybe 10,000ha (max of 10km by 10km!

Within an area of about 350,000ha)

This compares with about 2,000ha approved to date!

When we looked at Victoria as a whole we found;

Annual average consumption in Victoria

Annual Consumption Victoria			GWh of fuel	GWh of electricity	Area of PV farm (ha)
Electricity	44.3	TWh	44,300	44,300	61,528
Gas	214	PJ	59,492	35,695	49,577
Petrol	4336	ML	41,225	24,735	34,354
Diesel	5168.5	ML	55,462	27,731	38,515
				132,461	183,974

90,000ha is an area 30km by 30km and this will supply 50% of total annual consumption.

This is equivalent to a 1.5 km wide strip from Warrnambool to Mildura.

A fraction of the agricultural land in Victoria?

First Issue - What is the likely impact on the modernized irrigation system?

Water not land is limiting irrigated agricultural production in region!

Water use in the Goulburn Murray Irrigation District (GMID) has halved (2,000GL to 900GL) in last 20 years due to a combination

- Water buyback with more to come with the recent Murray Darling Basin Agreement!
- Water trade downstream to more productive land
- Policies to protect the environment
- Drier climate and less inflows

The extent of the modernized system is based on Delivery Shares (access to the system) held NOT the volume of water used on properties.

Despite the use of water halving in the GMID, the infrastructure still extends across the same land area, but now only half the land is irrigated.

What is the likely impact on the modernized irrigation system (cont)

The modernized system has connected land where

- 38% of the land area is used by irrigation farmers that use 82% of the water
- 30% of the land area is used by farmers that use very little water (<1ML per ha per year)
- 30% of the land area is used by farmers that are dryland but are still connected and maintain stock water supply
- 2% is held by small properties (<10ha)

This means that there is nearly 200,000ha of either dryland or very low intensity irrigation connected to the modernized system.

Using some of that under utilized system for solar farms is not going to change the system viability!

What is the likely impact on the modernized irrigation system (cont)

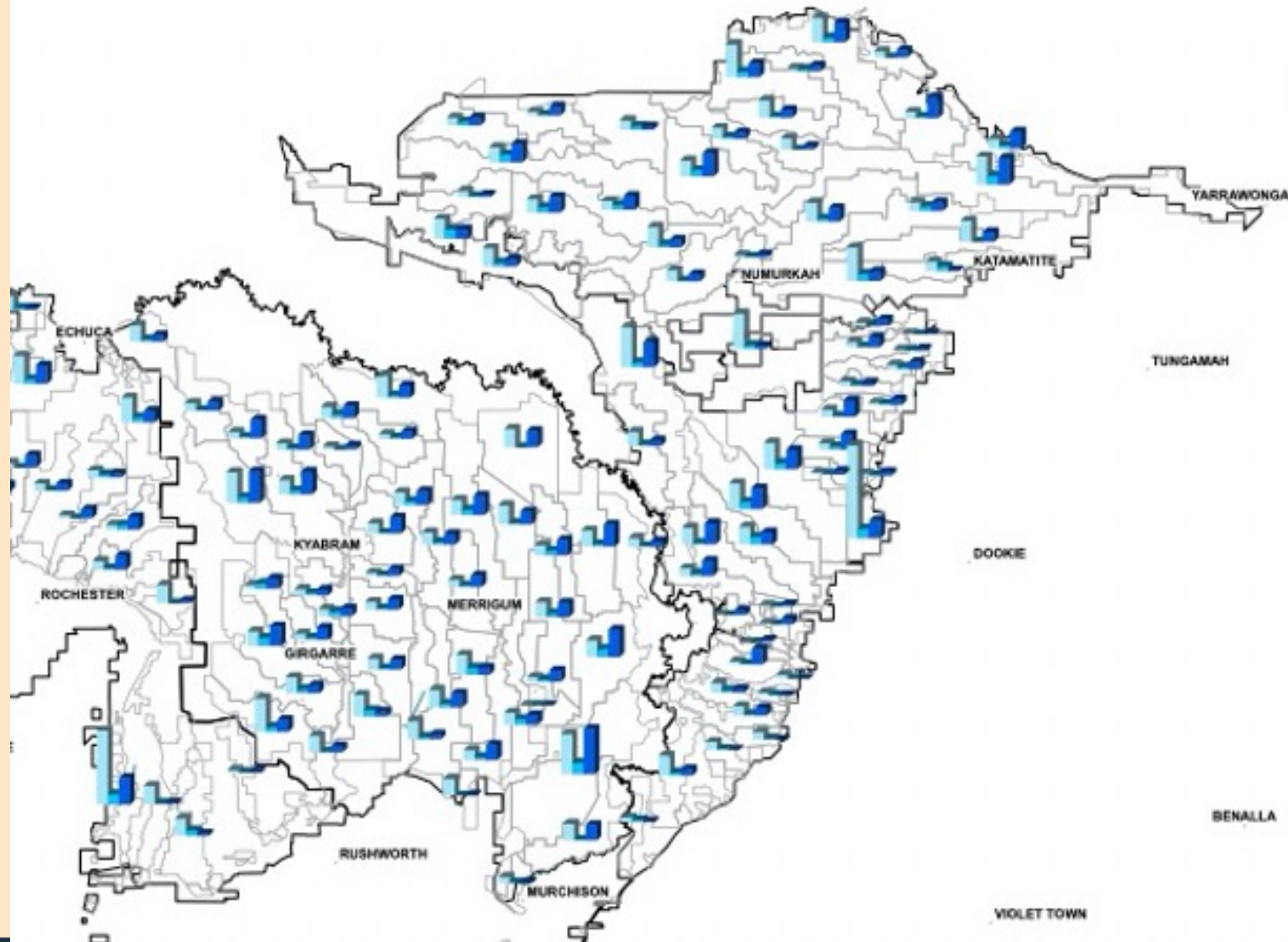
The connected land that is dryland or very low intensity is scattered everywhere!

This shows in each pod the land area

- i. Irrigated (dark blue)
- ii. Low intensity (blue)
- iii. Dryland (light blue)

For confidentiality reasons we cannot show you individual farms.

So 10,000 ha of solar farms scattered will not change the modernized system or how it is managed!



DELWP didn't agree with the conclusions of the study

DELWP (DEECA) changed the rules (planning scheme amendment VC224 and revised guidelines) again October 2022 - They now say

“If the site is a serviced property (as at 17 Sept 2019), has a water use licence in place, and the infrastructure is planned to be retained by the rural water corporation (not decommissioned), then these three factors, collectively, will mean that this site is unlikely to be a suitable location for development of a solar energy facility”.

This totally ignores reality of less water! Solar farms wont change that. Shepparton region suffers from excessive restrictions on solar farms.

Guidelines needs to be tested again in VCAT.

Second Issue - What about protecting the strategically important soils in irrigated areas?

Compared to 'dryland' agriculture

Horticulture has 10-60 times the economic production

Dairy has 5-10 times the economic production

Protecting the opportunities for Horticulture and dairy is the most strategically important.

High value agriculture target better soils (volcanic soils, alluvial, Cambrian ridge, etc) but these are a small (3%) of the total farm land area in Victoria.

Hence should protect the small areas of unique soils suitable for High value horticulture and avoid solar farms on these soils

Horticulture prefers the class 1 and 2 soils within the irrigation region.

Water use is concentrating on the better soils (class 1 and 2) but not completely

Theoretically there is plenty of good soils for irrigated horticulture that is currently connected and not fully utilized.

However, to be on the conservative side, we could restrict solar farms from properties with greater than 50ha of class 1&2 soils in irrigation areas.

This would have a small limitation on solar farms location in irrigation areas and also a small limitation in Victoria generally.

Relative Water use and Production Income for different Agricultural Industries in GMID

	ML/HA (TOTAL BUSINESS AREA)	\$ PER HA FACTOR – BASE IS \$1,000/HA	\$ PER ML FACTOR BASE IS \$450/ML
Apples/Peaches	4 -5	30 - 60	20 - 30
Colbinabban/Goulburn River flats - wine grapes	1 - 3	10 - 15 plus winery	10 - 40
Canning pears	4	15	7
Processing tomatoes	3	10	7
Dairy			
▪ Barns	3	10	7
▪ Conventional	2.8	5	4
Cropping			
▪ Maize	3	4	3
▪ Winter irrigated	2	2	1 – base case
Livestock irrigated	1.5	1.5	1 – base case
Dryland			
▪ Cropping	na	1 – base case	na
▪ Livestock	na	1 – base case	na

Provided we avoid some key unique soils that lend themselves to High value agriculture

Then the bulk of land (97% of farm land) in Victoria is used for winter crops and Livestock.

Need to put broad acre dryland Cropping/livestock into an economic perspective!

This table provides an economic basis for identifying strategically important agricultural land.

Third issue -What about the overall economic impact on agricultural production?

Generally a very small ag loss and a large energy value gain!

Shepparton region requires at most 10,000 ha of solar.

This would replace the equivalent of about 4-10 dryland farms which currently generate \$1,000 - \$1,500 /ha/year or a total of about \$10-15 million in gross farm income.

Victoria wide requires at most 90,000ha of solar

This would be located on dryland farms across Victoria broadacre dryland farmland where

Crop yields are typically 1 t/ha/100mm of annual rain, and

Crop income is around \$250/tonne

Thus a typical broadacre dryland farm currently generates a gross farm income in the

- Mallee - \$750/ha and
- Western district cropping is around \$1,500/ha

This would replace the equivalent of about 45 dryland farms which currently generate total of about \$90 million in gross farm income.

This compares with a total of 21,000 farm business grossing \$20billion across the whole of Victoria.

In SA Riverland irrigation districts some grape growers are removing wine grapes and replacing with solar farms because of the increased income.

These farmers consider that Solar farms are just a different form of farming?

Is vista the real issue? Objecting on the grounds of protecting strategic agricultural land is often the only way locals can object to their potential *changed vista*.

“Valuable agricultural production” is effectively about maintaining a “vista” of

- A monoculture of Canola or wheat/barley, or
- Cleared land with some tress but mostly pasture for sheep and cattle

How one views the current “vista” is different for every person where the current farm land use is seen by

Farmers -	as beautiful and normal whereas solar farms are ugly
First Nations people	as destruction of their lands whereas solar farms are positive for climate change
Economist	as having a small value of production compared to potential renewable value
Solar Engineer	as an area to convert to solar farms and create an engineering wonder
Environmentalist	as having a large carbon footprint from livestock/fertilisers which should be reduced

Many farmers want solar farms on the 50% of land In Victoria which is not farmed – the land that has significant environmental values?

Is protecting agricultural land really all about - NIMBY – aesthetics – different values?

Have we lost sight of the nexus between food, energy and water – is it simply interchangeable!