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FARMS, OR SOLAR FARMS?

As Alberta's solar industry grows, so does concern about the land these installations might claim

The use of agricultural land for renewable energy production has long been contentious. Recently, rifts have opened between levels of government on the topic, and it is at the heart of the province's decision to pause all renewable project approvals for 6 months. One of the land-use impact issues identified for examination during the pause is the "development of power plants on specific types or classes of agricultural or environmental land."

Key questions for policy makers centre on how much of the various types of land available in the province would be used for renewables. How much farmland could solar generation claim? Given that, presently, 1.3GW of solar generation capacity is installed in the province, and an Alberta Electrical System Operator model suggests this would need to increase to 5.2GW through 2041 to achieve 'net zero' by 2035 under a renewable intensive scenario, how much farmland are we talking about potentially putting into the shadow of solar arrays?

Using data from the footprint of existing solar installations in the province, we calculate that 0.08% of total agricultural land would be required. We compare this potential solar footprint, at just over 38,000 acres, to the amount of agricultural land and non-agricultural land in the province in Figure 1.

Less than 1 tenth of 1 per cent of all agricultural land would be required to host a 'net zero' solar future

The inset to Figure 1 compares this solar footprint to a breakdown of sub-types of agricultural land. If all of the new solar farms were to be set up on unirrigated crop land, the footprint would be 0.15% of that land. Similarly, 0.18% of natural and tame pasture land would be required if only that type of land were used. Higher returns on irrigated crop land – which are on average 3 times more costly per acre than other farmland types – create a strong disincentive for installing solar on these lands. Regardless, owners of irrigated land could choose to lease it for renewable purposes.

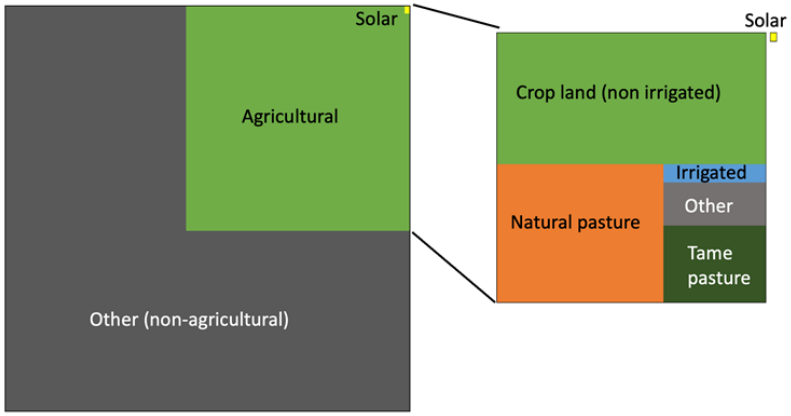

Figure 1. Alberta land by use type compared to a potential solar footprint with inset showing a breakdown of agricultural land into categories.

We calculate that, if they did and new solar farms were only set up on this high value land, 3% of the available irrigated acreage would be required.

These calculations are conservative. They assume no solar farms will be built on brownfield industrial land, buildings, or non-agricultural land. They do not take into account continued improvements in solar panel efficiency which would mean fewer panels with less footprint could produce the same amount of electricity. They disregard emerging techniques in agrivoltaics that enable the simultaneous use of land for both agriculture and solar production. And finally, despite evidence to the contrary, they offer policy makers an extreme case where solar is installed exclusively on high value agricultural land.

Responsible development rules and consultation with municipalities is clearly warranted to ensure renewable energy development does not repeat the mistakes of other forms of energy development in the province. As policy makers develop those rules, knowing how much potential solar farming land we're talking about is an important piece of the puzzle.

School of Public Policy | University of Calgary
The Simpson Centre. Thought for Food.
Authors: Sara Hastings-Simon, Hanan Ishaque, Guillaume L'hermie
www.policyschool.ca

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