Here Comes the Sun:
Solar Law in Alberta

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ENVIRONMENTAL LAW CENTRE (ALBERTA) SOCIETY

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THE ENVIRONMENTAL LAW CENTRE (ALBERTA) SOCIETY

The Environmental Law Centre (ELC) has been seeking strong and effective environmental laws since it was founded in 1982. The ELC is dedicated to providing credible, comprehensive and objective legal information regarding natural resources, energy and environmental law, policy and regulation in Alberta. The ELC's mission is to advocate for laws that will sustain ecosystems and ensure a healthy environment and to engage citizens in the law's creation and enforcement. Our vision is a society where laws secure an environment that sustains current and future generations and supports ecosystem health.

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Executive Summary

Throughout countless environmental transitions, we continue to rely on photons from space to be a consistent energy provider for the planet. In light of this, this report seeks to provide the law and policy context of this ever-renewable resource – solar energy. Harnessing solar energy is key to mitigating the production of greenhouse gas emissions, making the legal and policy context of solar energy development a foundational pillar to address climate change.

Part 1 of this report highlights the relevance of solar as a response to our energy needs and the need to mitigate our greenhouse gas emissions from energy production. Part 2 identifies the relevant regulatory framework at play in Alberta. Part 3 highlights select jurisdictional approaches that can shed some light on how Alberta can move forward to increase solar energy production and Part 4 identifies several policy and regulatory recommendations to help solar become a central pillar of Alberta's energy system.

As it currently stands, solar energy makes up a small but growing proportion of Alberta's electricity grid. If we want our law and policy framework to keep up with these advancements, reforms are needed. Specifically, there is the need to ensure law and policy is aligned to overcome barriers to adoption of solar energy. These barriers and recommended policy responses and set out in Table 1 below.

Table 1: Barriers to the efficient adoption of solar energy and policy responses for Alberta

Barrier	Regulatory or policy response
Conflicting land use priorities	Integrated planning for renewable development
Legal uncertainty around access to light	Solar easements Integrated planning for renewable development Solar covenants for new development
Solar readiness of building stock	Building code reform Municipal bylaws
Load and storage challenges	Integrated renewable planning

Financial impediments	Policy support for community and coop generation Reforming the *Municipal Government Act* to streamline the property assessed clean energy programs (Alberta's clean energy improvement tax) Feed-in tariff, renewable portfolio standard and other large-scale incentives

The ELC's recommended approach is focused at minimizing conflict and risk associated with solar developments both at a utility and a micro scale, increasing standards for solar readiness, and creating a supportive policy environment for community based solar, coop solar and the increased adoption of solar project on built infrastructure.

Throughout this report, we will strive to highlight the need for action now. With climate change effects already upon us, it is past time for aggressive action. In fact, the first solar bill in Alberta was put forward in 1980.

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Glossary

Baseload Generation: Generation capacity normally operated to serve the load around the clock.[1]

Combined Cycle: System in which a gas turbine creates electricity and the waste heat is used to create steam to generate additional electricity using a steam turbine.[2]

Contract for Difference: A contract for difference is a program similar to a feed-in tariff. It guarantees a fixed-price for renewable electricity and if the price achieved is below the fixed price, the operator receives the difference. If the price achieved is above the fixed price, the operator has to pay the difference.[3]

Feed-In Tariff: Program which guarantees a fixed-price for renewable electricity sold on the grid.[4] Often, it is accompanied by a guarantee that utility providers will contract with the renewable energy producers included in the feed-in tariff program. The feed-in tariff price is guaranteed for a set period of time, often based on the lifetime of the project.

Gigawatt Hour (gWh): A gWh is the equivalent of one-billion-watt hours. A watt hour is a unit of measure for electrical energy equal to one watt of power supplied to or taken from an electric circuit steadily for one hour.[5]

Greenhouse Gas Emissions: Gases that trap the heat of the sun in the Earth's atmosphere, producing a greenhouse effect.[6]

Kilowatt hour (kWh): A kWh is equivalent to 1,000-watt hours. A watt hour is a unit of measure for electrical energy equal to one watt of power supplied to or taken from an electric circuit steadily for one hour.[7] Electricity retailers generally bill in kWh.[8]

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[1] Alberta Electric System Operator, "Baseload generation" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[2] Alberta Electric System Operator, "Combined-cycle" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[3] UK Department for Business, Energy & Industrial Strategy, "What is the CfD scheme?" online: https://www.cfdallocationround.uk/what-is-the-CFD-scheme.
[4] Ben Thibault & Tim Weis, "Clean Electricity Thought Leader Forum: A Made-in-Alberta Proposal to Green the Grid" (21 May 2013) *Pembina Institute* at 13 online: https://www.pembina.org/reports/tlf-clean-electricity-standard-white-paper.pdf; Pembina Institute & Canadian Renewable Energy Alliance, "Feeding the Grid Renewably Fact Sheet" online: https://www.pembina.org/reports/feed-in-tariffs-factsheet.pdf.
[5] Alberta Electric System Operator, "Gigawatt hour" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[6] Alberta Electric System Operator, "Greenhouse gas (GHG) emissions" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[7] Alberta Electric System Operator, "Watt hour" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[8] Alberta Electric System Operator, "Kilowatt hour" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.

Levelized Costs: The lifetime average cost per kWh, allowing for the comparison of various technologies across different lifespans.[9]

Net Metering: A program that provides that when a customer's distributed energy system generates more power than the customer needs on site, that extra electricity flows onto the grid and the customer gets the credit on their energy bill.[10]

Peak Generation: This is the maximum power demand or load during a stated period of time. It can be calculated as the maximum instantaneous load or the average load over a designated interval of time.[11]

Property Assessed Clean Energy: A program which provides property owners with access to financing to cover 100% of project costs associated with energy efficiency upgrades. This program enables property owners to install energy efficiency upgrades on their property and pay for them over time through an assessment added to their property tax bill.[12]

Power Purchase Agreement: A long-term contract pursuant to which a customer buys electricity directly from a generator. A financial power purchase agreement is an agreement wherein the generator delivers all electricity to the power pool and the customer procures electricity from the power pool as normal. A physical power purchase agreement is an agreement wherein the generator delivers electricity after registering a net settlement instruction with the Alberta Electric System Operator. The net settlement instruction means that the Alberta Electric System Operator will subtract the quantity of electricity specified in the agreement from the power pool and the generator and customer will negotiate the price for that portion of electricity as specified in the power purchase agreement.[13]

Renewable Energy Certificate: A Renewable Energy Certificate ("REC") is a tradeable commodity generated by renewable electricity entities. One REC is generated for every MWh of

[9] U.S. Energy Information Administration, "Levelized Cost and Levelized Avoided Cost of New Generation Resources in the *Annual Energy Outlook 2018*" (March 2018) online: https://www.eia.gov/outlooks/archive/aeo18/pdf/electricity_generation.pdf.
[10] Troy A. Rule, "Solar Energy, Utilities, and Fairness" (2014-2015) 6 San Diego J of Climate & Energy L 115 at 118 [Troy A. Rule].
[11] Alberta Electric System Operator, "Peak Load/Demand" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.
[12] Municipal Climate Change Action Centre, "Clean Energy Improvement Program" online: https://mccac.ca/programs/clean-energy-improvement-program/.
[13] Simon Baines et al., "#HowtoPPA: An Examination of the Regulatory and Commercial Challenges and Opportunities Arising in the Context of Private Power Purchase Agreements for Renewable Energy" (2019) 57-2 Alberta Law Review 389 at 391-392 [Simon Baines].

renewable electricity created and RECs can be sold separately from the electricity they are associated with.[14]

Renewable Energy Portfolio Standard: A renewable energy portfolio standard is a quantity-based policy that requires a certain amount of power generated by renewable energy. It obligates utility companies to generate a specified share of their electricity by renewable energy.[15]

Simple Cycle: A plant with a gas turbine as the prime mover consisting of one or more combustion chambers where liquid or gaseous fuel is burned.[16]

[14] Public Services and Procurement Canada, News Release "Requests for Proposal launched for purchase of clean electricity in Alberta" (7 January 2021) online: https://www.canada.ca/en/public-services-procurement/news/2021/01/requests-for-proposal-launched-for-purchase-of-clean-electricity-in-alberta.html.
[15] Friedemann Polzin et al., "How do policies mobilize private finance for renewable energy? – A systematic review with an investor perspective" (2019) 236 Applied Energy 1249-1268 at 1253 [Friedemann Polzin et al.].
[16] Alberta Electric System Operator, "Simple-cycle" *Glossary of Terms* online: https://www.aeso.ca/aeso/glossary-of-terms/.

Part 1: Solar Energy & Alberta

The following section will define several types of solar energy and summarize the types of technology that fall under the solar umbrella.

First, it is important to distinguish between passive and active solar energy. Passive solar energy is the energy that comes in your windows to warm your home. Passive energy generation can be promoted through building codes, through building materials and approaches, and home orientation but is not reliant on specific solar technology.[17] Focusing on increased energy efficiency and other changes to the building code can encourage more passive solar generation, thereby limiting the amount of energy required for the active heating of buildings. However, passive solar energy will not be the focus of this report. Rather, we will focus on active solar technology. Active solar uses solar energy to heat a fluid – either liquid or air – and transfers that energy into the interior space or a storage system.[18]

There are three main types of active solar technology:

1. Solar Photovoltaic;
2. Thermal Solar Power; and
3. Concentrated Solar Power.

We will consider each in more detail below.

[17] Natural Resources Canada, "About Renewable Energy" (29 June 2016) Government of Canada online: http://www.nrcan.gc.ca/energy/renewable-electricity/7295#what.
[18] United States Department of Energy, "Active Solar Heating" online: https://www.energy.gov/energysaver/home-heating-systems/active-solar-heating.

Solar Photovoltaic

Solar photovoltaic (PV) technology is usually found in solar panels. More specifically, PV technology generates electricity directly from the sun via an electronic process that occurs using a semiconductor material.[19] In this process, electrons in the material are freed by the solar energy and travel through an electrical circuit, powering electrical devices or sending energy to the grid. [20]

PV technology can be used in both on and off grid applications and can range from less than 1 MW to gigawatts of energy produced. Depending on whether a solar energy system is grid connected or not will affect the technology needed. For example, grid connected systems require inverters to transform DC power into alternating current.[21]

PV systems (whether grid connected or not) also need to consider tilt. A tilt which is close to the latitude of the relevant location, minus 10 degrees, is often the best for maximising output in high latitudes such as Alberta.[22] Of all forms of solar technology, PV installation is predicted to grow the most in coming years.[23] Figure 1 (below) charts this increase. More recently the International Energy Agency has identified scenarios to meet "net zero" GHG emissions by 2050 through a rapid transition away from higher emission sources (coal, oil, and natural gas). This scenario highlights that the need to ramp up renewable electricity generation will be significant (from 29% in 2020 to nearly 90% in 2050 and increasing solar capacity 5-fold).[24]

[19] Solar Energy Industries Association, "Photovoltaics" online: https://www.seia.org/initiatives/photovoltaics#:~:text=Photovoltaic%20(PV)%20devices%20generate%20electricity,types%20of%20material%2C%20called%20semiconductors.&text=PV%20devices%20can%20be%20used,homes%20and%20large%20commercial%20businesses.

[20] Alberta Environment and Parks, Wildlife Directive for Alberta Solar Energy Projects, (4 October 2017) AEP Fish and Wildlife 2017 No.5 online: https://open.alberta.ca/dataset/6a71e752-8d72-4126-a347-e9f328279904/resource/527c6a99-4004-440c-8033-07872cb8adb0/download/wildlifedirective-albertasolarenergyprojects-oct4-2017.pdf [Wildlife Directive for Alberta Solar Energy Projects].

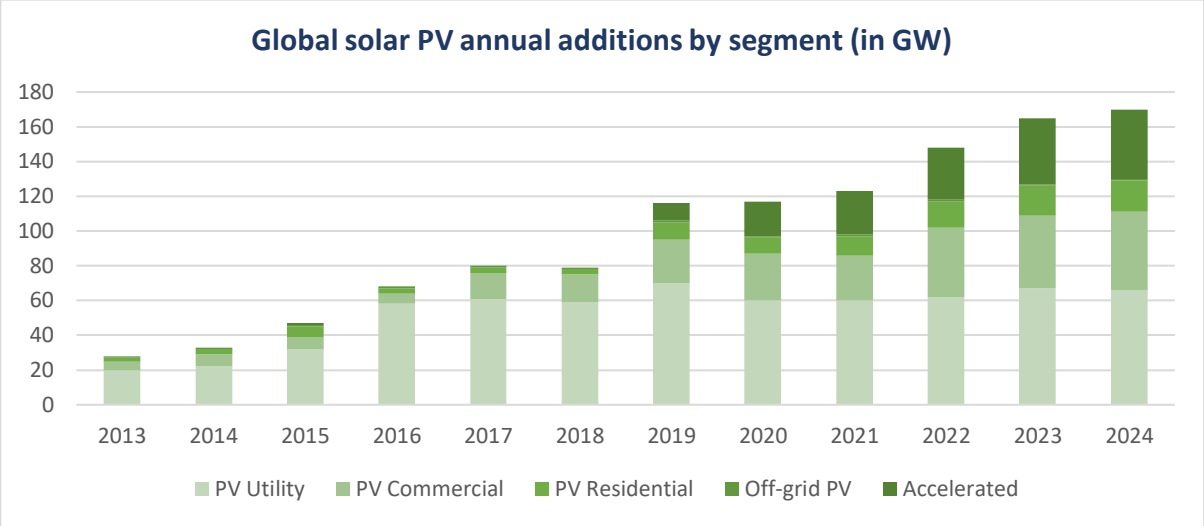
[21] International Energy Agency, "Solar Energy: Mapping the road ahead" (October 2019) at 24 online: https://webstore.iea.org/download/direct/2890?fileName=Solar_Energy_Mapping_the_road_ahead.pdf [Solar Energy: Mapping the road ahead].

[22] *Ibid* at 24.

[23] *Ibid* at 36.

[24] International Energy Agency, "Net Zero by 2050: A Roadmap for the Global Energy Sector" (May 2021) at 73 -74 online: https://iea.blob.core.windows.net/assets/4719e321-6d3d-41a2-bd6b-461ad2f850a8/NetZeroby2050-ARoadmapfortheGlobalEnergySector.pdf.

Figure 1: Growth in Solar PV Installations (International Energy Agency, 2019) [25]



Thermal Solar Power

Thermal solar technology collects energy from the sun and converts it to hot water for space heating and cooling in residential, industrial, and commercial settings.[26]

Although not as common as PV, thermal solar energy had a major breakthrough in Alberta where Canada's first thermal solar community is located – Drake Landing Solar Community.[27] This community is located near Okotoks and consists of 52 homes heated by 800 liquid solar energy systems in conjunction with borehole thermal storage to conserve the energy for use at night or through the winter.[28] Drake Landing has been successful with 12 years of operation with no unscheduled interruptions in heat delivery, consistently achieving above 90% of all energy needs in the last five years, and low electricity usage.[29] This community can serve as a model for thermal solar systems across the province.

[25] Solar Energy: Mapping the road ahead *supra* note 21 at Figure 18.
[26] Solar Energy Industries Association, "Solar Energy Technologies" (April 2018) online: https://www.seia.org/sites/default/files/inline-files/SEIA-Solar-Energy-Technologies-Factsheet-2018-April.pdf.
[27] Drake Landing Solar Community, "How it works" online: https://www.dlsc.ca/how.htm.
[28] *Ibid*.
[29] Drake Landing Solar Community, "Welcome to Drake Landing Solar Community" online: https://www.dlsc.ca/how.htm.

Concentrated Solar Power

Concentrated solar power (CSP) technology uses mirrors to reflect and concentrate sunlight onto one single point where it is collected and converted into heat, often through a generator which then produces electricity.[30] Different types of CSP include power tower systems which use a field of movable mirrors to heat fluid for steam turbines; a linear concentrator system which uses long mirrors to focus solar radiation on a central tube for fluid to absorb the energy; and a dish-engine system which uses mirrors oriented in a dish shape to concentrate rays on a receiver which transfers the heat to an engine generator.[31] A major benefit of CSP systems is that are a dispatchable form of solar as the heat can be stored and used for power generation when needed.

A study by R. Djebbar *et al*., found that the solar potential in Alberta was significant enough to justify comprehensive evaluation of the potential for CSP to be added to the grid.[32] Despite this, Alberta has no operational CSP projects, although a demonstration plant was operational in Medicine Hat for five years.[33]

Solar and its Rapid Rise

In its 2020 World Energy Outlook, the International Energy Agency ("IEA") concluded that "solar [has] become the new king of electricity".[34] In making this claim, the IEA forecasts that under a sustainable development scenario the change in electricity generation will result in solar energy capacity exceeding 8000 tWh (and nearly 5000 tWh under a "Stated Policies Scenario") – a huge increase. [35] In Canada, the Canadian Energy Regulator ("CER") has forecast (under an "evolving scenario") that solar capacity will increase from 2.9 GW in 2019 to 21 GW in 2050.[36] The CER further notes, however, that reaching the Canadian net-zero by 2050 goal will require even

[30] Wildlife Directive for Alberta Solar Energy Projects, *supra* note 20 at 3; Solar Energy: Mapping the road ahead, *supra* note 21 at 27 – 31.
[31] Wildlife Directive for Alberta Solar Energy Projects, *supra* note 20 at 3.
[32] R. Djebbar et al., "Potential of Concentrating Solar Power in Canada" 49 (2014) 2303 at 2312.
[33] Stephen Hunt, "After 5 years, Medicine Hat powers down $12M solar thermal power plant" (15 May 2019) *CBC News* online: https://www.cbc.ca/news/canada/calgary/solar-thermal-power-plant-mothballed-medicine-hat-1.5137428.
[34] International Energy Agency, "World Energy Outlook 2020: Outlook for Electricity" (October 2020) online: https://www.iea.org/reports/world-energy-outlook-2020 [World Energy Outlook 2020: Outlook for Electricity].
[35] International Energy Agency, "*Change in global electricity generation by source and scenario, 2000-2040*" (12 October 2020) online: https://www.iea.org/data-and-statistics/charts/change-in-global-electricity-generation-by-source-and-scenario-2000-2040-2.
[36] Canada Energy Regulator, "Canada's Energy Future 2020: Results" (2 December 2020) online: https://www.cer-rec.gc.ca/en/data-analysis/canada-energy-future/2020/results/index.html [Canada's Energy Future 2020].

further measures.[37] Regardless of the source, it is clear that solar is part of Alberta's energy future.

The benefits of moving toward solar energy are numerous and include:

- cost competitiveness;
- lower air emissions, including greenhouse gas emissions ("GHGs");
- a decentralized energy grid (although this comes with grid management challenges);
- job creation; and
- decreased water use.

This is not an exhaustive list and it is likely that things will shift as the solar industry grows, however, the relative benefits of solar are expanded upon below.

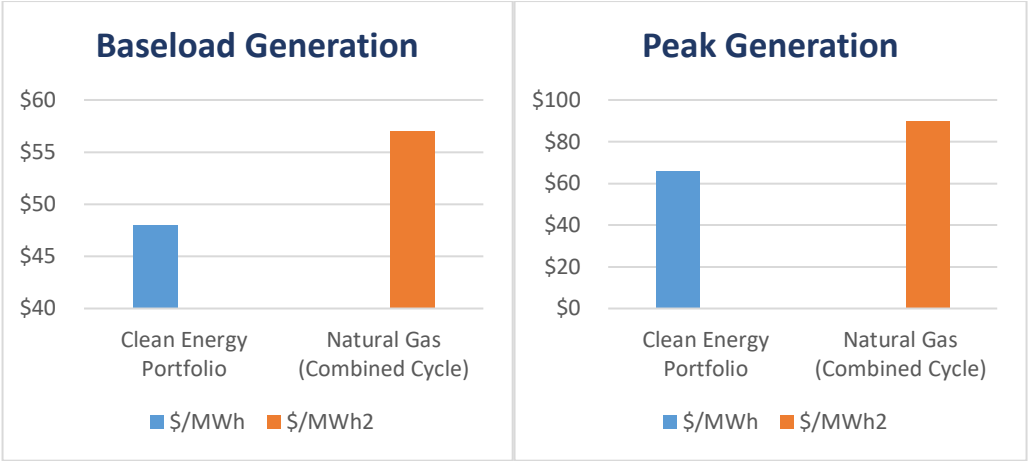
Cost

In 2020, the IEA stated that "for projects with low cost financing that tap high quality resources, solar PV is now the **cheapest source of electricity in history** [emphasis added]."[38]

A recent Pembina Institute study also found that solar energy was cost effective.[39] This study concluded that Alberta, a province with low cost natural gas, electricity that comes from a clean energy portfolio – which includes solar – provided the same service as electricity from combined cycle and simple cycle gas plants over the lifetime of the energy source (see Figure 2).[40] Specifically, they found that renewable energy portfolios created more energy (which the study considered a benefit) with equivalent capacity and flexibility, all at a lower cost.[41]

[37] *Ibid*.
[38] World Energy Outlook 2020: Outlook for electricity, *supra* note 34.
[39] Jan Gorski & Binnu Jeyakumar, "Reliable, affordable: The economic case for scaling up clean energy portfolios" (October 2019) *The Pembina Institute* online: https://www.pembina.org/reports/reliable-affordable.pdf.
[40] *Ibid* at 1.
[41] *Ibid* at 2.

Figure 2: Cost comparison of clean energy portfolio versus natural gas generation for baseload generation and at peak generation (Pembina Institute)[42]



[43]

Further, these cost considerations do not take into account the future cost of GHG emissions.[44] This is because, overall, the cost assigned to non-renewable energy production often ignores the realities of external costs including, "health risks, environmental damages from climate change, and structural damages to cities from rising sea levels."[45]

In other parts of the world the results are similar. For example, solar PV prices in Europe declined by about 80% between the years of 2010 and 2016.[46] In the United States, between 2010 and 2017, the levelized cost of utility-scale solar PV decreased approximately 78% while residential decreased by 69%.[47]

[42] *Ibid* at Figure 4.
[43] *Ibid* at Figure 4.
[44] *Ibid* at 5.
[45] Andrew Dickerson, "The Need for Centralized Government to Encourage a Decentralized Energy Grid" (2019) 3:1 Bus, Entrepreneurship & Tax L Rev 120 at 132.
[46] International Renewable Energy Agency, "Renewable Energy Prospects for the European Union" (February 2018) at 53 online: https://www.irena.org/publications/2018/Feb/Renewable-energy-prospects-for-the-EU.
[47] National Conference of State Legislatures, "Solar Policy Toolkit" (30 September 2018) U.S. Department of Energy online: https://www.ncsl.org/research/energy/solar-policy-toolbox.aspx [National Conference of State Legislatures, "Solar Policy Toolkit"].

Lower Air Emissions

Studies have found that switching to solar energy (especially in comparison to GHG intensive energy sources such as coal) would lead to a major reduction in overall GHG emissions.[48] For example, a US Department of Energy Study (the SunShot Vision study) found that increasing solar penetration in the energy market by 14% in 2030 and 27% in 2050 would be equal to a 13% or 18% reduction in GHG emissions, respectively.[49] This study found that this decrease in GHG emissions occurred even after considering all life-cycle stages of energy production including ongoing fuel-cycle emissions from the production and transport of fuels and from other aspects of power plant operations; construction related emissions; and emissions from end-of-life decommissioning.[50]

The SunShot study also found that increased solar energy is likely to lead to a decrease in non-GHG air emissions including lower emissions of sulfur dioxide, nitrogen oxides, and particulate matter in the power sector, estimating the cost benefits of these reductions at $167 billion in the form of lower future health and environmental damages.[51]

According to the Government of Canada, GHG emissions from the electricity sector decreased from 118 to 61 Mt CO_2 eq between 2005 and 2019, in large part due to the decommissioning of coal generated power plants in Alberta and Ontario with renewables offsetting some of the power needs.[52] As other sectors transition away from fossil fuels, particularly transport, the GHG profile of the nation will change and solar will play an important role.

A Decentralized Energy Grid

The World Alliance for Decentralized Energy defines 'decentralized energy' as "electricity production at or near the point of use, irrespective of size, technology or fuel used – both off-

[48] I. Miller, E. Gençer, H.S. Vogelbaum, P.R. Brown, S. Torkamani, F.M. O'Sullivan, "Parametric modeling of life cycle greenhouse gas emissions from photovoltaic power" (2019) 238 *Appl Energy* 760-774.
[49] The SunShot Vision study explored the potential for solar technologies to meet a significant share of electricity demand in the United States over the next decades specifying a future in which the cost of solar declined by 75% between 2010 and 2020. To read more about this study read the executive summary here: https://www.energy.gov/sites/prod/files/2014/01/f7/47927_executive_summary.pdf [SunShot Vision Study] and see Ryan Wiser et al., "On the Path to SunShot: The Environmental and Public Health Benefits of Achieving High Penetrations of Solar Energy in the United States" *National Renewable Energy Laboratory* (May 2016) at s 4 online: https://www.nrel.gov/docs/fy16osti/65628.pdf [Ryan Wiser et al.]. This analysis does not, however, consider the emissions necessary for the mining of requisite minerals.
[50] SunShot Vision Study, *supra* note 49 at s 4.1.
[51] Ryan Wiser et al., *supra* note 49 at s 5.
[52] Environment and Climate Change Canada, "Greenhouse gas sources and sinks: executive summary 2021" (2021) *Government of Canada* online: https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/sources-sinks-executive-summary-2021.html.

grid and on-grid."[53] A decentralized grid looks like an energy grid with more producers and many who are both consumers and producers. This would be in contrast with a centralized utility grid which relies on a small number of utility-scale energy producers.

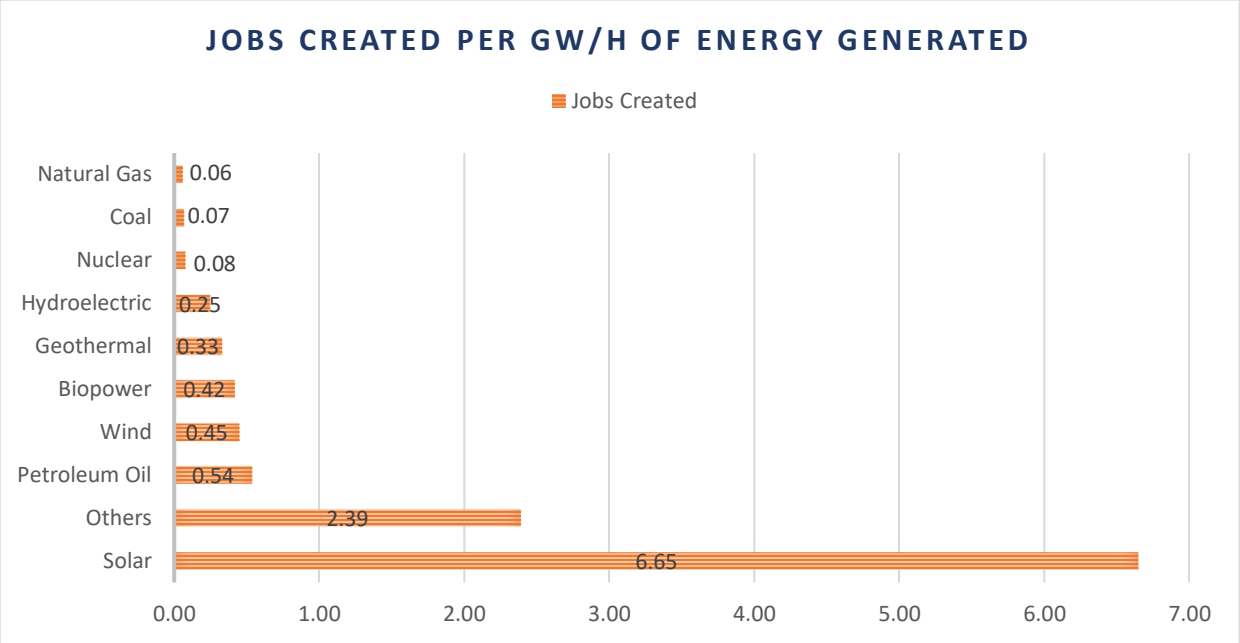
In Alberta a small number of rural communities still rely on diesel generators for their power needs. Diesel generation is expensive and polluting. A switch to solar, particularly off-grid solar, could enable these communities to transition away from diesel as the primary power source. One community that has already started this transition is Fort Chipewyan. Fort Chipewyan is a previously diesel-powered community in northern Alberta that has recently built a 7,500 solar panel project under the auspices of their newly created energy company, Three Nations Energy.[54] This project went online in November 2020 and is intended to provide 3,200 MW/h each year.[55] These projects represent a step away from diesel.

Job Creation

Evidence shows that the establishment and expansion of renewable energy production creates jobs.[56] In the United States, the National Conference of State Legislatures found that employment growth in the solar energy industry between 2013 and 2018 outpaced the nation's overall economic growth by nine times.[57] A 2018 review of employment numbers by power generation sector found that solar employs more people per MW/h than fossil fuels (see Figure 3).[58]

[53] World Alliance for Decentralized Energy, "What is DE?" online: http://www.localpower.org/deb_what.html.
[54] Alberta Utilities Commission, "Three Nations Energy GP Inc. Fort Chipewyan Solar Generation Facility (Phase 2)" (15 January 2020) online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/24857-D01-2020.pdf [Three Nations Energy GP Inc. Fort Chipewyan Solar Generation Facility (Phase 2)].
[55] Three Nations Energy, "About Three Nations Energy" online: https://www.3ne.ca/about-3ne/; Jordan Omstead, "Indigenous-owned solar farm opens in remote northern Alberta community" (19 November 2020) *CBC News* online: https://www.cbc.ca/news/canada/edmonton/indigenous-owned-solar-farm-fort-chip-1.5807721.
[56] Luciano Castillo et al., "Renewable Energy Saves Water and Creates Jobs" (7 August 2018) *Scientific American* online: https://www.scientificamerican.com/article/renewable-energy-saves-water-and-creates-jobs/ citing U.S. Department of Energy, "U.S. Energy and Employment Report" (January 2017) online: https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf [Luciano Castillo et al.].
[57] National Conference of State Legislatures, "Solar Policy Toolkit" *supra* note 47.
[58] Luciano Castillo et al., *supra* note 56.

Figure 3: Jobs created per GW/H of Energy Created by Energy Source (Luciano Castillo et al. , 2018)[59]



Despite some positive signs, these numbers only tell part of the story and the focus should remain on ensuring a just transition away from fossil fuels. A just transition refers to the need to focus on the effects of climate change policies on workers and communities.[60]

In Canada, the idea of a just transition has focused primarily on supporting coal workers and the surrounding communities who will be affected by the federal government's plan to phase out all thermal coal facilities by 2030.[61] However, if we are going to see a switch to renewable energy more generally, just transition programs will need to be expanded to include all those previously employed in the fossil fuel industry and the communities that support them. These programs could look like income supports, education funding, investments in infrastructure in affected communities, increased employment insurance, and a sensitivity for the cultural identity that may surround a community that has been involved in the same type of work for so long.

[59] *Ibid*.
[60] Hadrian Mertins-Kirkwood & Zaee Deshpande, "Who is included in a Just Transition? Considering social equity in Canada's shift to a zero-carbon economy" (August 2019) *Canadian Centre for Policy Alternatives* at 7 online: https://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2019/08/Who%20is%20included%20in%20a%20just%20transition_final.pdf.
[61] Government of Canada, "Just Transition Task Force" (22 January 2019) online: https://www.wd-deo.gc.ca/eng/19814.asp.

Water Use

Finally, one of the often-overlooked benefits of solar energy is that it uses far less water to generate electricity than many other forms of fossil fuel generation. This is particularly important in the southern and more populous part of Alberta where the risks associated with water scarcity are an issue.[62] The majority of the water necessary for solar power generation involves water use for panel and blade washing.

One U.S. study estimated that the lifecycle water consumption for solar PV was 0.02 m3 MWh−1.[63] The water savings from a switch to solar would be great and even more so if based on a transition away from coal – which, in comparison, has a lifecycle water consumption of 73.8 m^3 MWh^{-1}.[64] The lifecycle water consumption for natural gas is lower at 34.8 m^3 MWh^{-1}, but still represents an increase over that of solar energy.[65]

Solar in Alberta

Alberta is an overall excellent candidate for solar power largely due to the number of sunny hours we have per year.

In fact, Alberta has the second highest potential for solar energy production in Canada at 6.58 kilowatt hours per square meter over a month, second only to Saskatchewan at 6.79 kilowatt hours per square meter over a month.[66] Additionally, the PV potential of all Canadian capitals, including those with less PV potential than Alberta, is comparable to that of major cities such as Berlin and Tokyo, both of which have higher solar capacity.[67]

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[62] World Resources Institute – Aqueduct, "Water Risk Atlas" online: https://wri.org/applications/aqueduct/water-risk-atlas/#/?advanced=false&basemap=hydro&indicator=w_awr_def_tot_cat&lat=30&lng=-80&mapMode=view&month=1&opacity=0.5&ponderation=DEF&predefined=false&projection=absolute&scenario=optimistic&scope=baseline&timeScale=annual&year=baseline&zoom=3.

[63] Andrew J Kondash et al., "Quantification of the water-use reduction associated with the transition from coal to natural gas in the US electricity sector" (2019) *Environmental Research Letters* 14 at 7 online: https://iopscience.iop.org/article/10.1088/1748-9326/ab4d71/pdf.

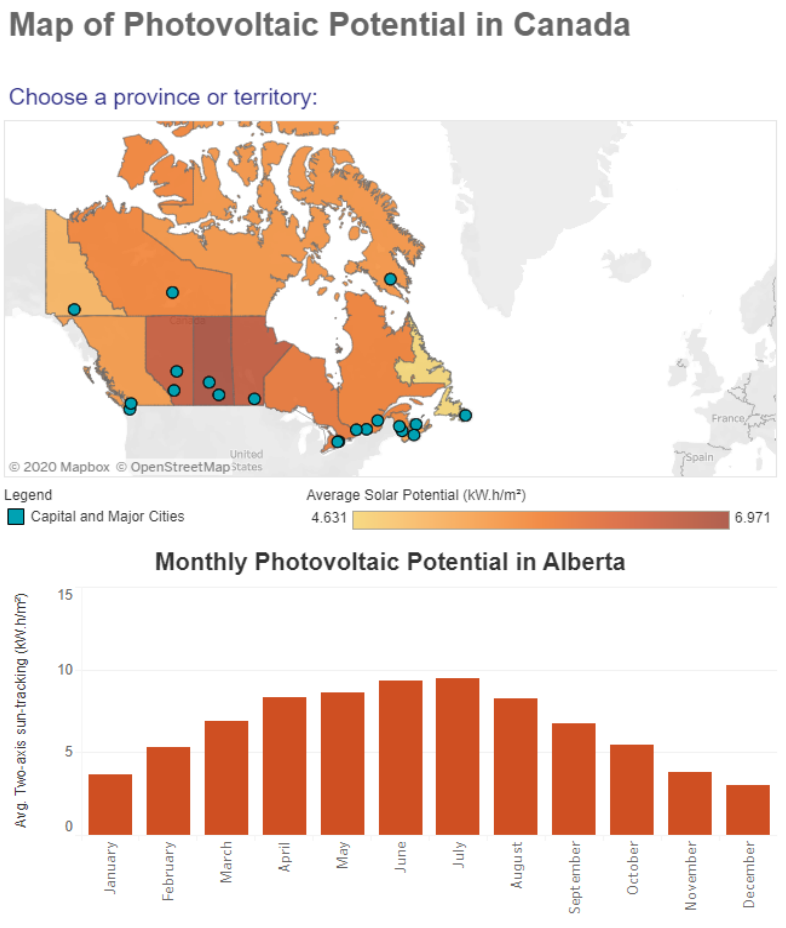
[64] *Ibid* at 7.

[65] *Ibid* at 7.

[66] Canada Energy Regulator "Market Snapshot: Which cities have the highest solar potential in Canada?" online: https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2018/market-snapshot-which-cities-have-highest-solar-potential-in-canada.html [Market Snapshot: Which cities have the highest solar potential in Canada?].

[67] Sophie Pelland et al., "The Development of Photovoltaic Resources Maps for Canada" (Paper delivered at the 31st Annual Conference of the Solar Energy Society of Canada, 20-24 August 2006), [unpublished] at s 3.2 online: https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/canmetenergy/files/pubs/2006-046_OP-J_411-SOLRES_PV+map.pdf.

Image 1: Map of Photovoltaic Potential in Canada (Natural Resources Canada)[68]



Major City	Average PV Potential (kW.h/m²)
Regina, Saskatchewan	7.15
Saskatoon, Saskatchewan	7.10
Calgary, Alberta	6.70
Winnipeg, Manitoba	6.61
Edmonton, Alberta	6.50
Yellowknife, Northwest Territories	6.18
Ottawa, Ontario	6.09
Montréal, Quebec	6.04
Toronto, Ontario	5.94
Mississauga, Ontario	5.93
Fredericton, New Brunswick	5.76
Québec, Quebec	5.75
Saint John, New Brunswick	5.68
Victoria, British Columbia	5.68
Charlottetown, Prince Edward Island	5.51
Iqaluit, Nunavut	5.49
Halifax, Nova Scotia	5.33
Vancouver, British Columbia	5.21
Whitehorse, Yukon Territory	5.02
St. John's, Newfoundland and Labrador	4.53

The Global Solar Atlas places Alberta in the highest range for PV power potential with more than 1,534 kWh yearly – even higher than Natural Resources Canada data.[69]

Unfortunately, even these promising numbers do not negate that winter will pose challenges for solar energy systems in Alberta. Snowfall and long hours of darkness will affect the solar power potential of new systems and must be considered during the cost and investment process. However, these challenges are not sufficient to tip the balance away from solar energy, nor do they negate the solar potential of our sunny province. For example, a study conducted by the Northern Alberta Institute of Technology found that solar panels only lose

[68] Market Snapshot: Which cities have the highest solar potential in Canada?, *supra* note 66.
[69] See map at: https://globalsolaratlas.info/map?m=site&c=27.137368,-89.472656,3&a=-122.167969,55.578345,-82.617188,53.852527,-85.078125,42.682435,-119.355469,41.902277,-122.695313,54.470038,-122.167969,55.578345.

about 3% of their energy due to snow buildup.[70] As technology advances, solar energy systems will be built to be more efficient even with snow or on cloudy days. This report will take the perspective that harnessing solar energy is a necessary move for Alberta, while recognizing that winter may require a more flexible approach.

Part 2: Regulation of Solar Energy in Alberta

Solar energy may make up a small proportion of our energy and electricity but it is growing fast. In light of this, Part 2 of this report will summarize the current framework in place in Alberta.

In 1980 a private members' Bill called *Bill 228: Right to Sunlight* was tabled in the Alberta legislature. The Bill focused on access to sunlight and, if passed, would have prohibited the erection or retention of any permanent structure, or any temporary structure for more than 90 days, if the structure impeded direct sunlight on to another person's property.[71] The Bill also purported to make the right to an unobstructed flow of sunlight on to property an interest in land that may be dealt with pursuant to the *Land Titles Act* and set out certain details to deal with solar impediments.[72] The Bill never passed but serves to demonstrate that solar energy has been on the legislature's radar for at least 40 years.

[70] Dr. Jim Sandercock & Tim Matthews, "Alternative Energy Program Solar Photovoltaic Reference Array Report" (31 March 2016) *Northern Alberta Institute of Technology* online: https://solaralberta.ca/sites/default/files/NAIT%20Reference%20Array%20Report.pdf; NAIT Newsroom, "Solar panels shine despite winter's blast, NAIT study finds" (12 July 2018) online: https://www.nait.ca/nait/about/newsroom/2018/solar-panels-shine-despite-winters-blast-nait-st#:~:text=The%20five%2Dyear%20NAIT%20study,only%20about%20three%20per%20cent.&text=It%20measured%20the%20impact%20of,on%20energy%20production%20than%20snowfall.

[71] Reference Bill 228, *An Act Establishing the Right to Sunlight,* 2nd Sess, 19th Leg, Alberta, 1980, s 1.

[72] *Ibid*, ss 2 - 4.

Regulatory Framework for Solar Energy

Renewable Electricity Act

The *Renewable Electricity Act* is an overarching piece of legislation that focuses on the promotion of renewable energy generation in the province.[73] The Act defines renewable energy resources as any "energy resource that occurs naturally and that can be replenished within a human lifespan, including, but not limited to (i) moving water (ii) wind (iii) heat from the earth (iv) sunlight and (v) sustainable biomass."[74] Importantly, it sets a target for 30% of all produced electrical energy in the province coming from renewable sources by 2030[75] – an important number to encourage growth in the solar industry but one without any enforcement measures.

Hydro and Electric Energy Act

The *Hydro and Electric Energy Act* sets out the process for the approval of power plants – defined as "facilities for the generation and gathering of electric energy from any source."[76]

In legislating this process, the Act states that no person shall construct or operate a power plant unless approved by the Alberta Utilities Commission (AUC).[77] This is the process most relevant to utility scale solar proponents and we will focus on four AUC rules in particular:

- Rule 007: Applications for Power plants, Substations, Transmission Lines, Industrial System Designations, and Hydro Development ("Rule 007");[78]
- Rule 012: Noise Control ("Rule 012");[79]
- Rule 024: Rules Respecting Micro-Generation ("Rule 024");[80] and
- Rule 033: Post-Approval Monitoring for Wind and Solar Power Plants ("Rule 033").[81]

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[73] *Renewable Electricity Act*, SC 2016, c R-16.5 [*Renewable Electricity Act*].
[74] *Ibid*, s 1(l).
[75] *Ibid*, s 2(1).
[76] *Hydro and Electric Energy Act*, RSA 2000, c H-16, s 1(1)(k).
[77] *Ibid*, s 11.
[78] Alberta Utilities Commission, *Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Development* (1 March 2021) online: https://www.auc.ab.ca/regulatory_documents/Consultations/2021-03-05-Rule007.pdf [AUC Rule 007].
[79] Alberta Utilities Commission, *Rule 012: Noise Control* (2 March 2020) online: http://www.auc.ab.ca/Shared%20Documents/Rules/Rule012.pdf [AUC Rule 012].
[80] Alberta Utilities Commission, *Rule 024 (Version 1.1) Rules Respecting Micro-Generation* (16 July 2019) online: http://www.auc.ab.ca/Shared%20Documents/Rules/Rule024.pdf [AUC Rule 024].
[81] Alberta Utilities Commission, *Rule 033: Post-approval Monitoring Requirements for Wind and Solar Power Plants* (1 July 2019) online: http://www.auc.ab.ca/regulatory_documents/Consultations/Rule033.pdf [AUC Rule 033].

Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, and Hydro Development

Rule 007 sets out the legislative and policy requirements project proponents must go through prior to AUC approval.[82] In 2021 the AUC updated Rule 007 and it will come into force in September 2021. In particular, the new Rule 007 includes information and requirements specific to solar power plant applications including a dedicated solar power plant application form.[83]

The new Rule 007 also recognizes the fast pace at which solar technology is changing. In light of this, project proponents can wait until 90 days before the anticipated project start date to advise the AUC of the technology type being used.[84] This recognizes the possibility of technological innovation between the initial application and the project start date.

Rule 007 sets out information requirements to be included in a solar power plant application form. For example, the project proponent must state the approvals that are being requested from the AUC and should describe the power plant and collector system, including the number of panels, the nominal capability of each solar panel and the total capability of the power plant in MW.[85] Other standard details include information about the project location, area maps, connectivity information, and an emergency response plan.[86]

Another important change is the detailed requirement for a solar glare assessment. Prior to this, the AUC approval process for solar projects often requested a solar glint and glare study to determine the levels of glare occurring from the project, particularly those that may affect surrounding individuals and properties but they were not clearly regulated.[87] Now, project proponents must submit a solar glare assessment report that predicts the solar glare at receptors within 800 metres from the boundary of the project and registered aerodromes and known unregistered aerodromes within 4,000 metres.[88] The report should include a number of details such as the time, location, duration, and intensity of solar glare predicted; the potential solar glare at critical points along highways, major roadways, and railways; the potential glare

[82] AUC Rule 007, *supra* note 78.
[83] Alberta Utilities Commission, "Solar power plant application" online: https://www.auc.ab.ca/regulatory_documents/Reference/Rule007_SolarPowerPlantApplicationForm.pdf?csf=1&e=IKp0QE [AUC Solar power plant application].
[84] AUC Rule 007, *supra* note 78 at s 4.3.1.
[85] *Ibid* at s 4.3.2, SP1.
[86] *Ibid* at s 4.3.2, SP3 – SP13.
[87] See for example: Alberta Utilities Commission, "Aura Power Renewables Ltd. Fox Coulee Solar Project" (13 August 2019) at para 140 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/23951-D01-2019.pdf [Aura Power Renewables Ltd. Fox Coulee Solar Project].
[88] AUC Rule 007, *supra* note 78 at s 4.3.2, SP14.

at aerodromes; a map of solar glare receptors; and a table with the expected intensity of solar glare.[89]

More specific details required include:[90]

- the pre-project environmental and land use conditions;
- any activities or infrastructure that may affect the environment;
- any ecosystem components that may be adversely affected by the project throughout the life of the project;
- all mitigation measures;
- monitoring activities; and
- the methodology and qualifications of the environmental evaluation.

Some of these details will not be required if an environmental assessment has been completed at the provincial or federal level. In that event, the assessment must be included.

Another important update is that the new Rule 007 requires an overview of how the operator will ensure that the project holds sufficient funds to cover the cost of decommissioning and reclamation at the end of the project's life cycle.[91] Finally, Rule 007 requires all projects to submit a signed Renewable Energy Referral Report from Alberta Environment and Parks along with a list of all other government departments for which an approval is required.[92]

Renewable Energy Referral Report – Wildlife Directive for Solar Energy Projects

Renewable Energy Referral Reports ("Referral Reports") are one step during the AUC power plant approval process. They are required under the *Wildlife Directive for Solar Energy Projects* (the "Directive") and are issued by Alberta Environment and Parks ("AEP"). Referral Reports are required for new projects and for certain amendments to existing projects.[93]

More specifically, Referral Reports are submitted by an AEP Wildlife Biologist and describe the mitigation efforts that must be undertaken (or have been undertaken) by the project developer to ensure that any environmental and health effects of the project are minimized.[94] Required

[89] *Ibid* at s 4.3.2, SP14.
[90] *Ibid* at s 4.3.2, SP15.
[91] *Ibid* at s 4.3.2, SP18 – SP19.
[92] *Ibid* at s 4.3.2, SP22.
[93] See for example: Alberta Utilities Commission, "C&B Alberta Solar Development ULC – Tilley Solar Project – Amendment, Time Extension, Ownership Transfer, and Connection Order" (21 February 2020) at paras 5 & 11 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/24434-D01-2020.pdf.
[94] Wildlife Directive for Alberta Solar Energy Projects, *supra* note 20.

mitigation efforts may include requirements for siting, monitoring, construction, and standard mitigation of risks to wildlife and habitat.

Choosing a Site

Specifically, the Directive focuses on how proponents should go about choosing a site for the location of a solar energy project as this is the first and most critical factor in preventing negative impacts on wildlife.[95] For example, the Directive states that location should not impact land with high conservation or wildlife value and that "solar energy project[s] should not be sited in areas of native grasslands, native parkland, old growth forest stands, named water bodies, valley breaks (including coulees), valleys of large permanent watercourses and the eastern slopes region".[96] Depending on the wildlife habitat, differing levels of protection are included in the Directive. Solar energy projects are to be sited to avoid critical habitat, with the definition of critical habitat coming from the Government of Canada, as identified through the federal species at risk regulatory process.[97]

The requirement that solar energy projects must be sited to avoid or minimize impact on certain wildlife zones including special access zones, key wildlife and biodiversity zones, and grizzly bear zones is even more stringent.[98] The strongest prohibition is set for certain wildlife zones where solar projects are not allowed including the greater sage-grouse range; caribou zone; and waterbodies with trumpeter swans.[99] The boundaries of these areas are determined by AEP and can be found on the AEP website as maps of key range layers or key wildlife layers, depending on the species.[100]

Each of these requirements are considered 'standards' which means they "are to be met in the planning and development of a solar energy project."[101] This is an important note because this is differentiated in the Directive from 'best management practices' which are "practices that may assist in the planning and location of activities."[102]

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[95] *Ibid* at 6.
[96] *Ibid* at 6.
[97] *Ibid* at 6. To determine critical habitat, one must look to species recovery strategies and action plans that have been produced pursuant to the *Species at Risk Act,* S.C. 2002, c. 29.
[98] *Ibid* at 6.
[99] *Ibid* at 6.
[100] Alberta Environment and Parks, "Wildlife sensitivity maps" online: https://www.alberta.ca/wildlife-sensitivity-maps.aspx; Brandy Downey, "Alberta Environment and Parks – Wildlife Review of Renewable Energy Projects" (PowerPoint presentation for Alberta Environment and Parks Operations Division) online: https://www.rockies.ca/project_info/Downey_Renewables%20_Miistakis%20munic_counties_Presentation_Jan%202018.pdf.
[101] Wildlife Directive for Alberta Solar Energy Projects, *supra* note 20 at 5.
[102] *Ibid* at 5.

Project Layout and Pre-Construction Standards

The second stage of the assessment deals with project layout and pre-construction standards. At this stage, the Directive requires wildlife and vegetation surveys, setbacks, and timing restrictions, all of which must be based on current information at the time of the approval.[103] Best management practices required at this stage include the requirement to avoid siting within the habitat of species of special concern; or near waterbodies, wide poplars, and multi-story, mature mixed-wood forests.[104]

Construction and Operation

Stage 3 deals with mitigation during the construction and operation stages. In this stage, project proponents are required to develop site and species specific construction and operational mitigation plans, including for any areas that will experience a temporary disturbance.[105] Plans must include timing restrictions, noise management, wetland protection, protection and management of wildlife movement, processes for preventing and responding to stranded and injured wildlife and must sequence construction activities to avoid sensitive periods for wildlife.[106] Overall, the Directive states that all construction activities associated with a solar energy project must minimize habitat disturbance and fragmentation as much as possible.[107]

Post-Construction

The Directive also sets out certain requirements for post-construction monitoring and adaptive management.[108] This monitoring is intended to assess the effectiveness of mitigation efforts and identify any ongoing wildlife risks through carcass surveys and wildlife monitoring.[109] This list is by no means exhaustive, but it does serve to demonstrate the detailed process that must be undergone to complete the requirements for a Renewable Energy Referral Report. Notably, however, the Directive only applies to solar projects larger than 1MW in size.[110]

Referral reports are not required for projects located in urban settings or on federal land.[111] For example, the AUC states in paragraph 27 of their decision approving the Edmonton E.L. Smith Solar Power Plant, that upon consultation AEP determined that because the project was

[103] *Ibid* at 8-9.
[104] *Ibid* at 9-10.
[105] *Ibid* at 11.
[106] *Ibid* at 10-11.
[107] *Ibid* at 11.
[108] *Ibid* at 14.
[109] *Ibid* at 14.
[110] *Ibid* at 2.
[111] Alberta Utilities Commission "Akamihk Energy Incorporated Montana First Nation Solar Facility" (10 January 2020) at para 13 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/24751-D01-2020.pdf.

proposed for an urban location, the Directive did not apply.[112] The Directive reasons that solar energy infrastructure has inherently low impacts on wildlife when "integrated into an existing anthropogenic footprint such as on rooftops".[113] However, it is questionable whether this is a reasonable decision given that the E.L. Smith Solar Power Plant is designated for river valley land. Amendments to the Wildlife Directive and how it is administered in urban natural spaces is required to ensure that wildlife impacts within urban environments are properly assessed.

Finally, because the Directive focuses on preventing harm to wildlife it has different emphases depending on the type of solar technology being proposed. For solar PV, the Directive is focused on mitigating direct collisions between avian wildlife and the panels.[114] Concentrated solar power ("CSP"), on the other hand, runs the risk of causing solar flux injuries resulting in incineration of avian wildlife or singeing of feathers.[115] CSP projects are deemed a higher risk on the whole, with the Directive specifically stating that CSP Projects will be identified in the Report as a high unmitigated risk for wildlife due to the high levels of wildlife mortality associated with this technology.[116] In general, however, habitat loss is still the largest contributor to negative impacts and solar projects are no different. Notably, most of this research has been conducted primarily on avian species and as solar projects increase in number, research may need to be expanded to include other species.

Solar Power Plant Application Form

The new Rule 007, released in March 2021, also includes a solar power plant application form.[117] This application form requires project proponents to describe the power plant and collector system including the make, model, and nominal capability of each solar panel in MW or the total capability of the power plant in MW if the equipment or vendors for the panels have not yet been selected.

The application will be helpful for project proponents, as it walks through the requirements laid out in Rule 007 including the solar glare assessment, environmental evaluation requirements, end of life management requirements, other approvals, and participant involvement details.

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[112] Alberta Utilities Commission, "E.L. Smith Solar Power Plant EPCOR Water Services Inc." (20 February 2019) at para 27 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/23418-D01-2019.pdf [E.L. Smith Solar Power Plant EPCOR Water Services Inc.].
[113] Wildlife Directive for Alberta Solar Energy Projects, *supra* note 20 at 2.
[114] *Ibid* at 3-4.
[115] *Ibid* at 4.
[116] *Ibid* at 7.
[117] AUC Solar power plant application, *supra* note 83.

Rule 007 also sets out specific application requirements for energy storage projects, including:[118]

- a description of the project with:
    - the total capability and storage capacity, both in MWh;
    - information about where the facility is charged from and discharged to;
    - any discussions regarding the interconnection concerns and plans;
    - a single line diagram for the project;
    - a recycling plan for the project's end of life;
    - a list of existing approvals for facilities directly affected by the project;
    - ownership details; and
- the project location;
- project connection information;
- an emergency response plan;
- environmental information with:
    - feedback from AEP addressing the environmental aspects of the project;
    - any impact assessment reports or an environmental evaluation; and
    - a project specific environmental protection plan; and
- end of life management including:
    - the clean-up and reclamation plan; and
    - plans to ensure funds are available for reclamation and decommissioning.

A noise impact assessment as set out in AUC Rule 012 is also required for energy storage projects.[119]

Finally, Rule 007 specifies the new participant involvement program for battery storage facilities which sets a notification radius for both urban and rural projects.

[118] AUC Rule 007*, supra* note 78 at s 10, BF1 – BF23.
[119] *Ibid* at s 10, BF24.

Table 2: Notification radius for battery storage facilities[120]

Size	Location	Notification Radius
≥150 kW but <1MW	urban	First row of occupied properties
	rural	400 metres
1 - <10 MW	urban	First row of occupied properties
	rural	800 metres
≥10 MW	urban or rural	800 metres

Rule 012: Noise Control

AUC Rule 012 outlines Noise Control requirements for new projects.[121]

The overall permissible sound level for a project is calculated with regard to both nighttime and daytime permissible sound levels with specific calculations for each.[122] To ensure that the permissible sound levels have been calculated and are being respected, the AUC requires a Noise Impact Assessment be submitted before project approval. This assessment ensures that the project will not exceed the maximum allowable decibel levels before and during operation.

Rule 033: Post-Approval Monitoring Requirements for Wind and Solar Power Plants

Rule 033 sets out the post-approval requirements for all solar power projects. Specifically, subsection 3(3) requires approval holders submit annual post-construction monitoring survey reports to both the AEP and the AUC.[123]

The requirements for these reports are set out in the AUC approval and may state something like: "the project proponent must submit an annual post-construction monitoring survey report to AEP and AUC within 13 months of the project becoming operational and on or before the same date every subsequent year for which AEP requires surveys."[124]

[120] *Ibid* at s 10, BF29.
[121] AUC Rule 012, *supra* note 79.
[122] *Ibid* at s 2.
[123] AUC Rule 033, *supra* note 81 at s 3(3).
[124] Alberta Utilities Commission, "Aura Power Renewables Ltd. Empress Solar Power Plant" (3 October 2019) at para 39 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/23580-D01-2019.pdf [Aura Power Renewables Ltd. Empress Solar Power Plant].

Approval holders must abide by:

- the project-specific recommendations pertaining to post-construction mitigation and monitoring;
- all requirements and commitments outlined in the project's referral report and any monitoring and mitigation plans;
- requirements for all site-specific post-construction surveys to be completed in the manner and for the period recommended by AEP;
- all post-construction monitoring requirements including that this monitoring is conducted by an experienced wildlife biologist;
- the requirement to use an AEP approved fatality estimator to calculate the corrected mortality rates for birds and bats; and
- the requirement to notify AEP of any carcasses of species of concern upon discovery.[125]

Environmental Protection and Enhancement Act

In addition to the aforementioned AUC approval process, certain approval requirements fall under the auspices of the *Environmental Protection and Enhancement Act* ("EPEA").[126] In 2017, the Government of Alberta amended the EPEA's Schedule of Activities to include the generation of wind and solar electrical power.[127] Specifically, these amendments expanded regulatory control over any activities associated with the construction, operation, or reclamation of these projects.[128]

Solar power plants with a total nominal capacity not exceeding 1 MW are specifically exempt from an environmental assessment under the EPEA while larger scale solar projects are not listed as either mandatory or exempt.[129] Nevertheless, environmental assessments may still be required for solar projects at the discretion of the Director.[130]

The Activities Designation Regulation includes "a plant that produces thermal electrical power (greater than 1 MW)" in the definition of power plant.[131] This definition could include solar projects, particularly concentrated solar power and thermal power plants.

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[125] AUC Rule 033*, supra* note 81 at s 3.
[126] *Environmental Protection and Enhancement Act*, RSA 2000, c E-12 [*Environmental Protection and Enhancement Act*].
[127] *Ibid,* Sched of Activities, s 2.
[128] *Ibid*, Div 1, s 40.
[129] *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Alta Reg 111/1993, sched 2(h).
[130] *Environmental Protection and Enhancement Act*, *supra* note 126, ss 41 – 44.
[131] *Activities Designation Regulation*, Alta Reg 276/2003, s 2(vv).

Conservation and Reclamation Regulation

The EPEA and its regulations set out requirements for the conservation and reclamation of specified land.[132] Conservation is defined as the "planning, management and implementation of an activity with the objective of protecting the essential physical, chemical, and biological characteristics of the environment against degradation."[133] Reclamation involves a number of activities including the removal of equipment, buildings, and structures; the decontamination of buildings, structures, land and water; the stabilization, contouring, maintenance, construction, and reconstruction of the land surface; and other operations as may be required by regulation.[134] Operators have a duty to conserve or reclaim specified land and to obtain a reclamation certificate, unless exempted by regulation.[135]

These requirements apply to 'specified land'. The *Conservation and Reclamation Regulation* defines specified land as land on which there was construction, operation, or reclamation of a renewable energy project, including solar projects.[136] The term operator is broadly defined under the Regulation as the person who conducted the activity, the statutory authorization holder, a working interest participant, the surface lease holder, the successor, assignee, executer, administrator, receiver, receiver-manager, trustee of the foregoing, or the principal agent of the foregoing.[137] Reclamation certificates can thus be required for renewable energy projects; although projects are exempt if they qualify as micro-generators under the *Micro-Generation Regulation* and if the total footprint boundary is not greater than 1 hectare.[138]

The regulatory details that accompanied these changes were released in September 2018 in the "Conservation and Reclamation Directive for Renewable Energy Operations."[139] Requirements include:[140]

- Completing a pre-disturbance site assessment before starting initial construction;
- Completing an interim monitoring site assessment, including a weed management plan;

[132] *Environmental Protection and Enhancement Act*, *supra* note 126, Part 6.
[133] *Ibid*, s 1(l).
[134] *Ibid*, s 1(ddd).
[135] *Ibid*, s 137.
[136] *Conservation and Reclamation Regulation*, Alta Reg 115/1993, ss 1(q.3) & (t) [*Conservation and Reclamation Regulation*].
[137] *Environmental Protection and Enhancement Act*, *supra* note 126, s 134.
[138] *Conservation and Reclamation Regulation*, *supra* note 136, s 15(1).
[139] Alberta Environment and Parks, "Conservation and Reclamation Directive for Renewable Energy Operations" (14 September 2018) AEP Land Policy 2018 No. 4 online: https://open.alberta.ca/dataset/8c4e8ed9-a9bb-4a1e-8683-8136b33f8dff/resource/f1704d4c-78af-4de3-91da-d9873e9f50a4/download/direct-renewenerop-sep14-2018.pdf.
[140] Alberta Utilities Commission, "Innisfail Solar Project Innisfail Solar Corporation" (15 May 2019) at para 28 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/24125-D01-2019.pdf.

- Monitoring disturbances during construction, operation, or any temporary/progressive reclamation activities;
- Completing a conservation and reclamation plan and submitting this by a prescribed date; and
- Conducting a reclamation certificate site assessment and obtaining a reclamation certificate.

The standard for reclamation is the achievement of equivalent land capability which is defined as "the ability of the land to support various land uses after conservation and reclamation is similar to the ability that existed prior to an activity being conducted on the land, but that the individual land uses will not necessarily be identical."[141] Once a reclamation certificate is obtained, the operator remains liable for environmental protection orders issued in relation to the specified land for 25 years.[142] Although the reclamation details rely on previously established reclamation criteria, specific requirements are necessary for a renewable energy reclamation certificate application. This includes a checklist, found in Appendix D of the regulation, which provides a list of all the information that will be required prior to a reclamation certificate being issued.[143]

The *Conservation and Reclamation Regulation* also sets out a system for the use of financial security. This enables the requirement that security is paid during the project approval process to ensure that reclamation is completed. Specifically, the amount required as security is an "amount determined by the Director to be sufficient to ensure completion of conservation and reclamation on the specified land."[144] It is unclear whether the financial security regime set out in the regulation would apply to solar projects. Solar projects are not included in the specific exemptions nor in the list of required projects.[145] Under the current regime, financial security is required for projects that:[146]

- require an approval under the *Activities Designation Regulation* and are listed in Division 3 of Schedule 1 of the regulation;
- require a mine approval;
- require a registration under the *Activities Designation Regulation* and are listed in Division 3 of Schedule 2 of the regulation; and

[141] *Conservation and Reclamation Regulation*, *supra* note 136, ss 1(e) & 2.
[142] *Ibid*, s 15.
[143] *Ibid*, Appendix D.
[144] *Ibid*, s 18(1).
[145] *Ibid*, ss 17 & 17.1.
[146] *Ibid*, s 17.

- are governed by a code of practice.

None of these include reference to solar projects or renewable energy projects more generally.

Despite this gap, the Regulation authorizes the Minister to designate an activity as requiring security despite it not being included in the above lists.[147] This provision would allow the Minister to require security for a solar project.

Micro-Generation Regulation

The *Micro-Generation Regulation* is focused on the regulation of generating units that: [148]

- exclusively use sources of renewable or alternative energy;
- are intended to meet all or a portion of the customer's total annual energy consumption;
- have a total nameplate capacity that does not exceed the lesser of 5 MW or the rating of the customer's site; and
- that supply electric energy only to a site that is located on property that the customer owns or leases.

This Regulation also enables a net-metering program whereby consumers will be credited for any excess electric energy produced which ends up on the grid.

The process for activating a micro-generating unit is dependent primarily on an agreement between the project proponent and their wire-service provider. [149] For most micro-generation projects, approval comes from the wire-service provider with AUC involvement limited only to party disputes.[150] If the dispute does get sent to the AUC for a decision, the decision is final and is not subject to appeal.[151]

In 2017, the reach of this Regulation was expanded with amendments allowing small micro-generators, those under 150 kW, to be credited for the electricity sent back to the grid on a monthly basis and at retail rates. Previously, projects of this size would not have qualified.[152]

[147] *Ibid*, s 17(2).
[148] *Micro-Generation Regulation*, Alta Reg 27/2008, s 1(h) [*Micro-Generation Regulation*].
[149] *Ibid*, s 2(1).
[150] *Ibid*, s 2(3).
[151] *Ibid*, s 2(4).
[152] *Ibid*, s 7(5)(a).

Meanwhile, large micro generators, sized 150 kW and above, are credited for electricity sent back to the grid at the hourly wholesale market price.[153]

The size of applicable micro-generators also increased from a previous maximum of 1 MW to a new maximum of 5 MW while allowing micro-generators to service two or more sites located on property that is owned or leased by the same customer.[154] These changes expanded who qualifies for the programs under this Regulation and in doing so expanded the ability of individuals to generate their own renewable power.

In conjunction with this Regulation, AUC Rule 024 applies specifically to micro-generators.

Rule 024: Rules Respecting Micro-Generation

Rule 024 sets out AUC requirements for projects classified as micro-generators. These are projects where the micro-generating unit is designed to meet all or a portion of the customer's total energy consumption **and** the total nameplate capacity of the unit does not exceed 5 MW.[155] Qualifying projects may be connected to the interconnected electric system without filing a power plant application with the AUC.

In order to be exempt from the AUC approval process, the project's construction and operation must not have any direct and adverse impact on another person; must not have any adverse environmental impact; and must be constructed and operated in compliance with Rule 012 requirements regarding noise impacts.[156]

Despite not being subject to the standard AUC process, micro-generating units must still notify and consult with any stakeholders and must complete a micro-generation notice which is sent to the owner for approval.[157] Within 14 days, the owner shall notify the micro-generation unit customer whether the owner accepts or disputes the notice. If there is a dispute, the project approval gets sent to the AUC for a decision.[158] The owner's dispute must be made clear to the unit customer within 14 days and must be filed with the AUC who has 30 days to issue its decision about the qualification of the unit as a micro-generator.[159]

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[153] *Ibid*, s 7(5)(b).
[154] *Ibid*, s 1(e) & 1(v).
[155] AUC Rule 024, *supra* note 80 at s 2.
[156] *Ibid* at s 2.
[157] The owner is defined in Section 1(i) of Rule 024 as the owner of an electric distribution system in the service area where the customer plans to construct or later and operate a micro-generation unit.
[158] AUC Rule 024, *supra* note 80 at s 3.
[159] *Ibid* at s 4.

Small Scale Generation Regulation

The *Small Scale Generation Regulation* ("SSG Regulation") focuses on the regulatory process for small scale renewable energy generation and is designed to bridge the gap between micro-generation and utility scale projects.[160]

One purpose of this Regulation is to enable "neighbours, community groups, municipalities, agricultural societies, rural and urban co-ops, universities, schools, Indigenous communities and other groups to partner on small-scale renewable energy projects such as wind, biomass, hydro or solar that provide community benefits."[161]

The Regulation defines renewable energy as:[162]

> "Electric energy generated from products having current EcoLogo certification or solar, wind, hydro, fuel cell, geothermal, biomass or other generation sources, if the emissions intensity of the electric energy produced or the total energy produced from the production of electrical and thermal energy is less than, or equal to, 418 kg of CO_2e per MWh."

Under the Regulation, project proponents can apply as either a small-scale generating unit or a community generating unit.

Qualifying as a Small Scale Generating Unit

In order to qualify as a small-scale generating unit a project must:[163]

- be properly considered an eligible generating unit;
- exclusively use sources of renewable or alternative energy;
- be part of an interconnected electrical system or be located within an isolated community (as defined by the *Isolated Generating Units and Customer Choice Regulation*);[164] and
- ensure that the distribution system has sufficient hosting capacity at the interconnection point to accommodate the generating unit.

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[160] *Small Scale Generation Regulation*, Alta Reg 194/2018 [*Small Scale Generation Regulation*].
[161] Government of Alberta, Media Release, "Putting power in the hands of communities" (22 November 2018) online: https://www.alberta.ca/release.cfm?xID=620855BF8D8B3-9B90-88C9-FD9330F8A9406D44.
[162] *Small Scale Generation Regulation*, *supra* note 160, s 1(l).
[163] *Ibid*, s 1(g).
[164] *Isolated Generating Units and Customer Choice Regulation*, Alta Reg 165/2003.

Unlike community generating units, small scale generating units do not need to prove community benefits and are limited primarily by distribution capability. Although the criteria for small scale generation units is left relatively undefined in the Regulation, a statement from the now defunct Energy Efficiency Alberta indicated that there is no limit on the size of a unit. The only limit comes from constraints associated with the distribution system's capacity.[165]

In order to qualify as a small scale generator, the owner of an eligible generating unit must apply to the distribution owner for the service area in which the generating unit is located.[166] The application must be reviewed by the distribution owner, who has authority to determine whether the generating unit is qualified as a small scale generating unit.[167] In the event that the distributor does not approve the generating unit as small scale, the application can be forwarded on to the AUC where the matter must be decided within 30 days of receipt of a "notice of dispute".[168] This process is similar to the micro-generation approval process, with only disputes ending up at the AUC, streamlining the application process.

Once a generating unit qualifies as a small scale generating unit under the Regulation, the distribution owner is responsible for connecting the unit to the distribution system and for ensuring that a meter suitable for the nameplate capacity of the unit is installed at the interconnection point.[169] The distribution owner must provide metering services for units within its service area and must ensure that the meter data manager provides the meter data to service providers, load settlement agents, and the ISO.[170]

Qualifying as a Community Generating Unit

To qualify as a community generator, a project proponent must demonstrate the project's community benefits.[171] Benefits can be social, economic, and/or environmental and may specifically include activities such as training and development opportunities, contributions to a community endowment fund, or development of community infrastructure.[172] In order to

[165] Energy Efficiency Alberta, "Community Generation Online Resource Hub - FAQ" online: https://efficiencyalberta.ca/renewables/community-generation-online-resource-hub/small-scale-regulation-faq.
[166] *Small Scale Generation Regulation*, *supra* note 160, s 2(2).
[167] *Ibid*, s 2(3).
[168] *Ibid*, s 2(4).
[169] *Ibid*, s 4(1).
[170] *Ibid*, s 4(2).
[171] *Ibid*, ss 1(b) & (c).
[172] Municipal Climate Change Action Centre, "Connecting to Alberta's Grid with Community Generation" (3 April 2020) online: https://mccac.ca/2020/04/03/connecting-to-albertas-grid-with-community-generation/.

qualify as a community generator a project proponent can apply directly to the AUC with a community benefits agreement or community benefits statement.[173]

Community benefits agreement – A community benefits agreement is a legally binding written contract between a small-scale power producer and a community group in respect of a small-scale generating unit that confers social, environmental, or economic benefits to the community group.[174] A community benefits agreement is required between the community group and developer when the community group does not have an equity stake in the generating unit but is receiving other benefits from the project.[175]

Community benefits statement – A community benefits statement is a statement in writing made by a small-scale power producer that qualifies as a community group. The statement must pertain to a small-scale generating unit wholly owned by the community group and should set out the social, environmental, or economic benefits flowing to the community group.[176] This is a requirement for projects when the owner of the unit is not involved in any type of partnership.[177]

Community group – The Regulation defines a community group as a co-operative, a school board, a board of a public post-secondary institution or private college, an Indigenous band, a Metis settlement, a municipal authority, a society, an incorporated congregation, an irrigation district, an agricultural society, a condominium corporation, a registered charity, or an association under the *Companies Act* or *Rural Utilities Act*.[178]

Certain benefits accrue to the project once community generating unit status has been achieved. Once the application for a community generating unit has been finalized, the distribution owner must purchase a meter (to a max of one meter per facility) for any community generating units not located in an isolated community. If a community generating unit *is* located within an isolated community, the distribution owner must purchase a meter (to a max of one per facility) and is responsible for the cost of any system reliability upgrades.[179] These costs are compensated by the independent system operator ("ISO") with the amount of

[173] *Small Scale Generation Regulation*, *supra* note 160, s 3(1).
[174] *Ibid*, s 1(b).
[175] Marc Baxter & Stephanie Ripley, Webinar: *Understanding Community Generation in Alberta* (Alberta: Municipal Climate Change Action Centre, 2020) [Webinar: *Understanding Community Generation in Alberta*].
[176] *Small Scale Generation Regulation*, *supra* note 160, s 1(c).
[177] Webinar: *Understanding Community Generation in Alberta, supra* note 175.
[178] *Small Scale Generation Regulation*, *supra* note 160, s 1(e).
[179] *Ibid*, s 5(3)(a) & (b).

compensation determined by the AUC, who can recover this amount through an ISO tariff or fee.[180] In Alberta, the ISO is the Alberta Electric System Operator ("AESO").

Several community-based projects have been qualified as community generating units by the AUC. The Three Nations Energy Solar Project located near Fort Chipewyan was deemed to be a community generating unit in early 2020 after the project proponent submitted a community benefits agreement signed by Three Nations Energy and the Athabasca Chipewyan First Nation, the Mikisew Cree First Nation, and Fort Chipewyan Metis Local 125.[181] This agreement, in conjunction with ATCO's confirmation that the project was a small scale generator, were sufficient for the AUC to grant the project community unit status and confer upon it the corresponding benefits.[182] Other projects that have been approved as community generating units include solar projects in Innisfail,[183] Oyen,[184] Vulcan,[185] and on the Peavine Metis Settlement.[186]

One challenge that remains with the community generating unit application process is that observers have noted limited clarity about what a community benefits agreement or community benefits statement entails. Professor Nigel Bankes notes that due to the redaction of AUC documents and a lack of explanation within approval decisions, the elements required for a successful community generating unit remain unknown.[187]

AUC Rule 007

In 2021, the AUC released a new Rule 007 which sets out the application requirements for power plants and related infrastructure including changes relevant to solar energy projects and community projects. More details about this Rule are outlined above.

Specifically, for small scale generation the new Rule incorporates requirements for community generating unit applications. Applications must include a description of the eligible generating

[180] *Ibid*, s 5(2)(a) & (b).
[181] Three Nations Energy GP Inc. Fort Chipewyan Solar Generation Facility (Phase 2), *supra* note 54 at para 15.
[182] *Ibid* at para 26.
[183] Alberta Utilities Commission, "Innisfail Solar Corporation: Innisfail Solar Project Time Extension and Community Generation Designation" (21 May 2020) online: https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/25459-D01-2020.pdf.
[184] Alberta Utilities Commission, "2113260 Alberta Ltd. Community Generation Designation for Oyen Community Solar Project" (17 June 2020) online: https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/24845-D04-2020.pdf.
[185] Alberta Utilities Commission, "2181731 Alberta Ltd. Vulcan County Community Solar Project" (25 June 2020) online: https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/25471-D01-2020.pdf.
[186] Alberta Utilities Commission, "Peavine Metis Settlement 4.97-Megawatt Community Solar Power Plant" (4 May 2020) online: https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2020/25236-D01-2020.pdf.
[187] Nigel Bankes, "Community Generation Projects in Alberta" (June 30, 2020), online: ABlawg, http://ablawg.ca/wp-content/uploads/2020/06/Blog_NB_CommunityGenerationProjects.pdf.

unit including the quantity, make, model, and total capability.[188] A legal description of the location must be included and project proponents should make sure to identify if the generating unit is located in an isolated community.[189] The project proponent must also identify whether an AUC approval is required and if not, why an exemption should be made. For example, if the generating unit does not require an AUC approval because it is a small power plant under the *Hydro and Electric Energy Regulation*, the project proponent must identify this and confirm that the unit complies with that regulation.[190]

Project proponents will be subject to eligibility requirements including confirmation that the unit qualifies as a small scale generating unit and must describe how the community group satisfies the regulatory definition. Finally, project proponents must confirm that there is a community benefits agreement or statement in place and describe the benefits being received by the community group, among other technical details.[191]

The AUC website also indicates that "the development process of the community generation portion of the Regulation is to be determined and will not be addressed in the current discussions".[192] At the time of writing, no process had been released.

AUC Forms

In December 2019, the AUC published two small scale generation forms, the "Small Scale Generation Application Form" and the "Small Scale Generation Notice of Dispute Form."[193] The Small Scale Generation Application Form is the required form to indicate interest in a small scale generation project. Required information includes:

- details about the site,
- whether the project is intended to be a small scale generating unit or a community generating unit,
- whether the project is 1MWac or larger,
- a description of the project, and
- a list of required supplementary documents.

[188] AUC Rule 007*, supra* note 78 at s 4.7.1, CG1.
[189] *Ibid* at s 4.7.1, CG2.
[190] *Ibid* at s 4.7.1, CG3.
[191] *Ibid* at s 4.7.1, CG5 – CG9.
[192] Alberta Utilities Commission, "Small scale generation" (19 December 2019) online: https://engage.auc.ab.ca/smallscalegeneration.
[193] *Ibid*.

The Small Scale Generation Notice of Dispute Form is to be completed by the Distribution Owner in the event of a dispute about the eligibility of a small scale generating unit. The form requires information about the distribution owner, the dispute itself, and a copy of the application form. Both of these forms are available as Word documents on the AUC website.[194]

In March 2021, the AUC released the Community generating unit application form as part of the updated Rule 007. The form is available now but the Rule does not come into force until September 2021. Required details include a description of the generating unit and the quantity, make, model and total capability in MW and the location of the generating unit including the legal description; whether it is located within an isolated community; and a confirmation of whether the generating unit requires an AUC power plant approval.[195]

The application form provides details regarding eligibility requirements for community generating units. The form specifies that the project proponent should describe how the community group associated with the generating unit satisfies the definition of community group in the Regulation; the benefits received by the community group including the category each benefit falls within (i.e., social, environmental, economic); ownership details; and a detailed breakdown of the costs of meter equipment for the project.

Municipal Government Act

The *Municipal Government Act* (MGA) sets out the duties, powers, and functions of municipalities in the province.[196] In particular, the MGA sets out the purposes of a municipality, which include fostering the well-being of the environment.[197] Further, the MGA authorizes all municipalities to pass bylaws and to regulate planning and development within their jurisdiction. The cities of Edmonton and Calgary have further expanded powers through the city charter regulations.[198]

The MGA states that municipalities may pass bylaws for municipal purposes including "the safety, health and welfare of people and protection of people and property" – a general welfare

[194] *Ibid*.
[195] Alberta Utilities Commission, "Community generating unit application" online: https://www.auc.ab.ca/regulatory_documents/Reference/Rule007_CommunityGeneratingUnitForm.pdf?csf=1&e=92amZP.
[196] *Municipal Government Act*, RSA 2000, c M-26 [*Municipal Government Act*].
[197] *Ibid,* s 3(a.1).
[198] *City of Calgary Charter, 2018 Regulation*, Alta Reg 40/2018, s 4 [*City of Calgary Charter*]; *City of Edmonton Charter, 2018 Regulation*, Alta Reg 39/2018, s 4 [*City of Edmonton Charter*].

bylaw.[199] Municipal powers in Canada have been interpreted as broadly enabling bylaws on environmental issues that surpass provincial requirements.[200]

The *Edmonton and Calgary City Charter Regulations* extend the specific enumerated powers to include authority to make bylaws for the "well-being of the environment" including "implementation and management of programs respecting …climate change adaptation and greenhouse gas emission reduction."[201]

In terms of planning, a municipality may (and in some cases must) make a variety of statutory plans. These include intermunicipal development plans, municipal development plans, area structure plans, and area redevelopment plans. A municipality may make non-statutory plans dealing with matters of planning and development. In terms of development, each municipality also passes a Land Use Bylaw which addresses matters such as zoning and development permits.

While municipal plans can set planning priorities, an AUC licence, permit, approval, or authorization will prevail over any municipal statutory plan.[202] Similarly, a condition of a licence, permit, approval, or other authorization granted by enactment from the Lieutenant Governor in Council, Minister, Provincial agency, or crown-controlled organization prevails over any development permits that conflict.[203]

Laws to Facilitate Solar Growth

A clear regulatory framework is critical for a healthy solar market; however, as we work on establishing such a framework, we also need to engage more people in solar energy production. This section will focus on property assessed clean energy programs ("PACE") which are designed to incentivize solar installation.

Property Assessed Clean Energy (PACE)

PACE programs are a tool that "provides access to long-term financing for energy efficiency, water conservation, renewable energy, and resiliency measures for owners and developers of

[199] *Municipal Government Act*, *supra* note 196, s 7.
[200] See, for example, 114957 Canada Ltée (Spray-Tech, Société d'arrosage) v Hudson (City of) [2001] 2 S.C.R. 241.
[201] *City of Calgary Charter, supra* note 198, s 4; *City of Edmonton Charter, supra* note 198, s 4.
[202] *Municipal Government Act*, *supra* note 196, s 619(1).
[203] *Ibid*, s 620.

residential, commercial, industrial, institutional, and multi-family properties."[204] Some of the benefits of a PACE program include that it: [205]

- is voluntary;
- does not require government funding;
- is available for 100% of a project's costs; and
- can be combined with other programs and incentives.

Practically speaking, a PACE program allows property owners to take out a loan to cover the costs of renewable energy or energy efficiency installations on their property. The loan is covered by the PACE program administrator and is repaid through property taxes. Generally, PACE programs run with the property which means that the property owner who is receiving the benefits of the upgrades is also the one covering the costs.

In Canada, only Ontario, Nova Scotia, and Alberta have specific PACE legislation in place and, as you will see, the Alberta program is still in its infancy.[206]

Alberta

In 2018, the Alberta government passed Bill 10: *An Act to Enable Clean Energy Improvements* which amended the *Municipal Government Act* ("MGA") to enable a PACE like program (Alberta's Clean Energy Improvement Program).[207] Under this program, municipalities pay the upfront costs of each energy system and repayment is collected through property taxes.[208] Under the Alberta program, loans run with the property.[209]

The MGA authorizes municipalities to create clean energy improvement tax bylaws which set out the details of each individual PACE program.[210] Once a municipality has passed a clean energy improvement tax bylaw, individual property owners may apply to the program administrator for a clean energy improvement project on their property, subject only to the proper application and accompanying application fee.[211] It is only after the program

[204] Madi Kennedy, Tom-Pierre Frappe-Seneclauze & Betsy Agar, "Property Assessed Clean Energy in Canada: Design Considerations for PACE programs and enabling legislation" (June 2020) *Pembina Institute* at 3 online: https://www.pembina.org/reports/property-assessed-clean-energy-2020.pdf [Madi Kennedy, Tom-Pierre Frappe-Seneclauze & Betsy Agar].
[205] *Ibid* at 3 - 4.
[206] *Ibid* at 5.
[207] Bill 10: *An Act to Enable Clean Energy Improvements*, 4th Sess, 29th Leg, Alberta, 2018 [assented to 11 June 2018].
[208] *Municipal Government Act*, *supra* note 196, s 390.1(1).
[209] *Ibid*, s 390.5.
[210] *Clean Energy Improvements Regulation*, Alta Reg 212/2018, s 5.
[211] *Ibid*, ss 7 & 8.

administrator has approved an improvement that the municipality and property owner may enter into a clean energy improvement agreement.[212] A clean energy improvement agreement lays out how the property owner will be responsible for paying back the loan through their property/municipal taxes.

The details of this program are set out in the *Clean Energy Improvements Regulation*.[213] This Regulation enables the Minister to designate a program administrator[214] and calls on them to create a list of the types of renovations, adaptations, or installations for which clean energy improvement agreements may be made.[215] They are also responsible for creating a list of Qualified Contractors eligible to complete the work.

In June 2020, Energy Efficiency Alberta (the original program administrator) was dissolved by the Government of Alberta.[216] Since then, the Alberta Municipal Services Corporation ("AMSC"), a subsidiary of the Alberta Urban Municipalities Association, has taken over as program administrator for what is now known as the Clean Energy Improvement Program.[217] The AMSC will work with municipalities to help them pass the necessary bylaws, ensure projects are properly installed, and pay the Qualified Contractors for their work.[218] As of spring 2021, Devon, Rocky Mountain House, and Canmore have all passed a Clean Energy Improvement Program bylaw and both Devon and Rocky Mountain House plan to launch their programs in summer 2021.[219]

A Right to Sun

Current Law on Access to Sunlight

Early English common law recognized a right to sun based on the principle of prescriptive easements and at the time it was known as the 'ancient lights doctrine.'[220] This doctrine

[212] *Ibid* s 10.
[213] *Ibid*.
[214] *Ibid*, s 2.
[215] *Ibid*, s 3.
[216] Energy Efficiency Alberta, "Transition of Energy Efficiency Alberta" (11 June 2020) online: https://efficiencyalberta.ca/about/blog/transition-of-energy-efficiency-alberta.
[217] Clean Energy Improvement Program, "About" online: https://www.myceip.ca/about/.
[218] Clean Energy Improvement Program, "Municipalities" online: https://www.myceip.ca/municipalities/.
[219] *Ibid*.
[220] Kamaal R. Zaida, "Solar Energy Policy in Canada: An Overview of Recent Legislative and Community-Based Trends toward a Coherent Renewable Energy Sustainability Framework" 17 Mo. Envtl. L. & Pol'y Rev. 108 (2009) at 115 online: https://scholarship.law.missouri.edu/cgi/viewcontent.cgi?article=1361&context=jesl [Kamaal R. Zaida].

provided that if a landowner's access to sunlight from an adjoining property continues for an uninterrupted period of time, she acquires an easement to sunlight which may not be obstructed by adjacent landowners.[221] In fact, this doctrine is still being litigated in the United Kingdom. In 2016, the Court of Appeal for England and Wales heard the case of *Ottercroft Ltd v Scandia Care Ltd* in which the Court upheld a mandatory injunction against a developer who infringed upon an adjoining owner's right to light.[222]

When English common law was adopted throughout Canada, this doctrine came along. However, Section 49 of the 1955 *Limitations Act* eliminated it in Alberta stating that "no right to the access and use of light or any other easement, right in gross or profit a prendre shall be acquired by a person by prescription, and no such right is deemed to have ever been so acquired."[223] While this Act was later repealed, this provision was enacted instead in the *Law of Property Act,* which is still in force today. [224] This, in effect, means that historic access to light does not create a legal right of easement or other property related right to maintain that light. However, an easement or restrictive covenant for solar access, discussed more below, could be upheld if clearly granted by the adjoining landowner and registered on title. Courts may also recognize other common law rights as they relate to solar access, particularly if solar access for a solar energy system use is recognized as a reasonable use or if the public policy benefits of increased solar energy are acknowledged. However, relying on common law remedies requires access to the courts and litigation is expensive, time consuming, and backwards looking so, even if successful, it may not prevent the loss of solar access in the first place.

If solar access is the goal, legislative reform is the better option.[225] The challenge is in creating a legislative provision that is fair across all (or most) scenarios. For example, the solar access law in California prohibits unduly restricting the construction of solar energy systems in the majority of cases, with only a few exceptions.[226] In contrast, in Wisconsin, the restriction on blocking a solar energy system is limited to construction or vegetation which impedes solar access more than one year after the solar energy system is completed.[227] Although this does help to ensure

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[221] Julie Krivitsky, "Solar Rights and Renewable Energy in Alberta" (2010) Canadian Institute of Resources Law at 13-14 online: https://prism.ucalgary.ca/bitstream/handle/1880/47976/SolarOP31w.pdf;jsessionid=849128362EFB25667646F9239810E7C3?sequence=1 [Julie Krivitsky].

[222] *Ottercroft Ltd v Scandia Care Ltd* [2016] EWCA Civ 867.

[223] *Limitations Act*, RSA 1955, c 177, s 49.

[224] *Law of Property Act*, RSA 2000, c L-7, s 69(3) [*Law of Property Act*].

[225] Law Reform Commission of Saskatchewan, "Background Paper: Solar Access Legislation" (October 2007) at 5 online: https://commentary.canlii.org/w/canlii/2007CanLIIDocs220?zoupio-debug#!fragment/zoupio-_Toc3Page5/(hash:(chunk:(anchorText:zoupio-_Toc3Page5),notesQuery:'',scrollChunk:!n,searchQuery:'solar%20law',searchSortBy:RELEVANCE,tab:search)) [Law Reform Commission of Saskatchewan].

[226] *California Solar Rights Act of 1978*, ch. 1154, § 2, 1978 Cal. Stats. 392 [*California Solar Rights Act*].

[227] Wisconsin Statute § 844.22.

property owners have some degree of certainty, it still allows for interference with solar access during the first year.

In Alberta, a solar access law would benefit from having additional direction from municipal planning and development regulation and by enabling solar easements (discussed further below). The use of planning, zoning and development regulation and related municipal processes should incorporate solar access considerations in developments. This municipal integration should consider both vegetation and construction. For example, if a solar access law restricts a build but allows large trees to shade a solar energy system, it may not be effective. Wisconsin provides us an example of this by codifying solar nuisance to include vegetative growth. This allows property owners to bring a court action in the event that vegetation on a neighbouring property interferes with their solar energy system. Codifying a specific definition of nuisance could make a court action more streamlined and with a higher success rate but would not eliminate the other challenges associated with litigation.

How Can Common Law Actions Be Used to Preserve Solar Access?

Common law actions are those that rely on court precedent to derive relief from past decisions and established principles. As we work to create a regulatory system, common law can be used as a tool for those looking to protect their investments and existing solar energy systems. The following section will highlight two of the potentially relevant common law actions, nuisance and trespass. It is important to note, however, that reliance on civil actions of this nature is less than ideal, and, due its reactive and costly approach to preserving rights, certainly less ideal than codifying planning and rights of solar access (as discussed later).

Nuisance

The tort of nuisance arises when interference with an interest in land occurs. If an interest in land is substantially affected, the activity which unduly interferes with the use or enjoyment of the land may give rise to an action in nuisance.[228] Simply, nuisance describes unreasonable interference with the use and enjoyment of land.[229]

[228] Julie Krivitsky, *supra* note 221 at 13-16.
[229] Allen M. Linden & Bruce Feldthusen, *Canadian Tort Law* (Markham: Ontario Butterworths, 2011) at 578.

If plaintiffs are going to be able to successfully bring an action against another party for an interference with their solar energy system, they will first have to overcome the precedent set in the case of *Earl Putnam Organization Ltd. v MacDonald ("Earl Putnam").*[230] In this case, the Court found that there was no cause of action for private nuisance for the obstruction of the right to light for enjoyment. However, this case may be distinguished on the basis that the right to light being requested in *Earl Putnam* was light for enjoyment rather than for powering or heating a home through the use of solar energy, particularly if there is legislative recognition of a right to light or recognition of the public policy benefits associated with solar energy use. Second, plaintiffs would need to distinguish their right to solar access from the *Law of Property Act* section prohibiting prescriptive rights to light. This may also be possible because when that section was passed, there would not have been any contemplation of solar energy systems like a solar PV system. However, it is not a guarantee.

If solar access is recognized, it is likely that a solar energy system could be considered as reasonable use or enjoyment of a home. For example, it is clear that Canadian winters require central heat to ensure structures are habitable year-round and if solar energy was required for heating a home, it is not difficult to assume that unrestricted solar energy is an example of reasonable use.[231] Nevertheless Canadian case law has not specifically dealt with the context. One case in British Columbia found that shading of property had to involve a "substantial and significant" interference to justify it being an actionable wrong.[232]

If solar access is deemed as a reasonable use of property and a neighbouring property's use of their land involves unreasonable and substantive interference with the solar energy system, the tort of nuisance could provide protection. Nuisance law protects all substantial interests in land from unreasonable interference, generally with few exceptions.[233]

Trespass

Trespass is defined as the intentional direct invasion of land.[234] In order to find trespass, damage to the land does not need to be shown but there must be evidence that the property is privately owned and that it was intentionally trespassed upon.[235]

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[230] *Earl Putnam Organization Ltd. v Macdonald* (1978) 21 OR 815.
[231] Marie-Ann Bowden, "Protecting Solar Access in Canada: The Common Law Approach" (1985) 9:2 Dal LJ 261 at 270 [Marie-Ann Bowden].
[232] *Wallace v. Joughin*, 2014 BCPC 73 at para 239.
[233] Joseph M Charter, "Wisconsin Supreme Court Sees the Light: Nuisance Remedy Granted for Obstruction of Solar Access" (1983) 11:1 Ecology LQ 47 at 60.
[234] Marie-Ann Bowden, *supra* note 231 at 275.
[235] *Ibid* at 275-276.

Trespass is relevant to solar access because of the common law right that landowners control the air space located vertically above the land surface of their property.[236] This means that a landowner may be able to access the tort of trespass if it is found that their neighbour has built something overhanging the landowner's property, therefore infringing upon the airspace, and in turn, potentially preventing the landowner from using a solar energy system.[237]

The difficulty in proving trespass in Alberta occurs due to the angle of the sun that falls on the province.[238] Although we have a lot of solar potential, most of this solar energy descends on an angle, which means that it passes through the airspace of another property before getting to the property in question.[239] This may mean that trespass is only available to certain solar customers, particularly those who have large properties.

Financial Incentives

Municipal & Provincial Financial Credits

Across Alberta, at the time of writing, different municipalities provide residents with different financial incentives for solar projects. Some of these programs are listed below.

Banff: The Town of Banff has implemented a Solar Photovoltaic Production Incentive. This is a post-install rebate that awards residents a rebate of $750/kW of solar capacity installed, to a maximum 7.5kW.[240]

Brazeau: In Brazeau County the incentive program provides a rebate for solar panels installed on grid-connected residential sites and provides $0.75/watt up to a maximum of $10,000.[241]

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[236] Eran Kaplinsky & David Percy, "A Guide to Property Rights in Alberta" *Alberta Land Institute* at 10-11 online: http://propertyrightsguide.ca/assets/a-guide-to-property-rights-in-alberta.pdf.
[237] *Didow v Alberta Power Limited*, 1988 ABCA 257 [*Didow v Alberta Power Limited*].
[238] *Corbett v Hill* (1870) LR 9 Eq 671 highlights the owner's right to air space that forms a vertical column of air above your property; Ronald M. Khrulak, "A Legal Review of Access to Sunlight in Sunny Alberta" (1981) The Alberta Environmental Research Trust at 17 online: http://www.hme.ca/sdplans/A%20Legal%20Review%20of%20Access%20to%20Sunlight%20in%20Sunny%20Alberta.pdf [Ronald M. Khrulak]. See also *Didow v Alberta Power Limited, supra* note 237 for a brief history of caselaw that summarizes the law regarding rights to the airspace directly above your property.
[239] Alberta Agriculture and Forestry, "Agroclimatic Atlas of Alberta: Climate Basics" (16 January 2015) Government of Alberta online: https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag6294.
[240] Town of Banff, "Solar Power" (23 April 2020) online: https://www.banff.ca/807/Solar-Power.
[241] Brazeau County, "Municipal Energy Efficiency Rebate Program Expands" (October 2018) online: https://www.brazeau.ab.ca/2018/10/25/municipal-energy-efficiency-rebate-program-expands.php.

Canmore: In Canmore, residents can apply for the solar incentive program with a minimum 3 kW solar electric system for residential or commercial projects.[242]

Edmonton: Edmonton offers residential properties $0.40/watt towards the cost of a solar energy system to a maximum of 40% of the eligible system costs or $4,000.[243]

Medicine Hat: In Medicine Hat, residents can receive $1.00/watt to a maximum of $6,000 for residential utility customers.[244]

The provincial government has also created the Alberta Municipal Solar Program. This is a funding program available for municipalities with rebates up to $1.5 million in the form or up to 30% of eligible expenses.[245] It is run by the Municipal Climate Change Action Centre and installations have been finalized in many cities and towns including Medicine Hat, Mayerthorpe, Bon Accord, and more.[246]

The Municipal Community Generation Challenge is funding a new project called RenuWell. This project repurposes legacy oil and gas infrastructure for community solar development. The project proponents received $2 million to install 2MW of distributed solar generation on abandoned oil and gas lease sites in Taber, Alberta. They intend to install solar energy while retraining oil and gas workers to work in the renewable energy sector, reusing previously developed land to protect agricultural land, and accelerating reclamation for abandoned wells. Check out their website to read more.

Federal Programs

A limited number of programs exist at the federal level to encourage renewable energy projects, including solar.

[242] Town of Canmore, "Solar Incentive Program" (2020) online: https://canmore.ca/latest-articles/canmore-solar-initiative.
[243] City of Edmonton Change Homes for Climate, "Solar Program" online: https://homes.changeforclimate.ca/residential-solar-program-terms-and-conditions/.
[244] City of Medicine Hat, "Solar Electric" online: https://www.medicinehat.ca/government/departments/utility-sustainability/hat-smart/2020-rebates/solar-electric/how-to-participate.
[245] Municipal Climate Change Action Centre, "Alberta Municipal Solar Program" online: https://mccac.ca/programs/alberta-municipal-solar-program/.
[246] Municipal Climate Change Action Centre, "Project Showcase" online: https://mccac.ca/project-showcase/.

The Emerging Renewable Power Program

The Emerging Renewable Power Program is a federal program designed to mitigate the risks associated with emerging renewable power projects through government funding. It is designed to allow emerging renewables to play a larger role in Canada's electricity supply.[247] In January 2019, the program announced funding for the construction of a new solar farm in southeastern Alberta near Suffield. This project will create 23 MW of generating capacity and uses a novel approach which captures energy from both sides of the solar panel while it tracks the sun's daily trajectory. Specifically, the federal government committed $15.3 million over two years.[248]

The Canadian Renewable and Conservation Expense

A specific regulatory move at the federal level included changes to the *Income Tax Regulations*.[249] These updates lowered the accelerated capital cost allowance for specified clean energy generation and energy conservation equipment that meet the requirements of Class 43.1 or 43.2 of Schedule II to the *Income Tax Regulations*.[250] This section is designed to encourage investment in clean energy generation through income tax incentives.[251]

In general, expenditures that qualify as a Canadian Renewable and Conservation Expense for income tax purposes may be fully deducted in the year incurred or carried forward indefinitely and deducted in future years.[252] Overall, these changes were designed to encourage more investment in renewable energy, including solar.

> On January 7, 2021 the federal government announced two new programs intended to increase solar energy production. First was a request for proposals to purchase new clean electricity in Alberta intended to power federal operations in the province. The second is a decision to purchase Renewable Energy Certificates attributable to regions where new clean renewable sources are not yet available. Read more about these plans here.

[247] Natural Resources Canada, "Emerging Renewable Power Program" *Government of Canada* online: https://www.nrcan.gc.ca/climate-change/green-infrastructure-programs/emerging-renewable-power/20502.
[248] Natural Resources Canada, News Release, "Canada Invests in Advanced Solar Technology in Alberta" (24 January 2019) online: https://www.canada.ca/en/natural-resources-canada/news/2019/01/a.html.
[249] *Income Tax Regulations*, CRC c 945.
[250] *Ibid*, sched II, classes 43.1 & 43.2.
[251] CanmetENERGY, "Technical Guide to Class 43.1 and 43.2" (2013) *Natural Resources Canada* at 5 online: https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/Class_431-432_Technical_Guide_en.pdf.
[252] *Ibid* at 5.

Part 3: Jurisdictional Enlightenment

How have other jurisdictions facilitated solar energy uptake? What lessons can be learned from other countries? Keeping these questions in mind, the following section will take a closer look at the solar energy framework in select Canadian provinces, the United States, and Germany.

British Columbia

Solar Hot Water Ready Regulation

The *Solar Hot Water Ready Regulation* (under the *Building Act*) focuses on solar readiness for new builds.[253] The Regulation requires that new residential buildings, defined as single dwelling units or single dwelling units with one secondary suite, must be built with a designated area for a solar collector to be used in a domestic hot water system.[254] The Regulation requires the designated area be the size of two typical solar collectors which can be installed on a roof, wall, building lot or accessory building such as a garage.[255]

Ensuring all future builds are solar ready helps to lower the costs and structural impediments for those interested in installing solar in the future. However, these benefits are limited by the exemptions included in the Regulation. Specifically, if a building owner argues that the building location is not suitable for future solar energy, they can apply to their local government for an

[253] *Solar Hot Water Ready Regulation*, BC Reg 101/2011 [*Solar Hot Water Ready Regulation*].
[254] *Ibid*, s 3.
[255] Office of Housing and Construction Standards, "Guide to the Province of BC Solar Hot Water Ready Regulation 2013" (May 2013) 2nd ed. *Government of British Columbia* at 2 [Office of Housing and Construction Standards, "Guide to the Province of BC Solar Hot Water Ready Regulation 2013"].

exemption.[256] This exemption applies to those buildings that are in permanent shade, for example due to trees or surrounding buildings.[257]

The *Solar Hot Water Ready Regulation* requires designers to consider the additional load value of a solar energy system when making design calculations.[258] The Regulation mitigates against structural issues that may impede future installation decisions.

Solar readiness is a foundational part of our efforts to increase solar energy penetration, however, this Regulation focuses on hot water heating systems – one of many types of technology that may be used in solar powered buildings. It is also limited to single family dwellings, leaving out those who live in multi-family dwellings, commercial buildings, and others. Finally, exemptions may limit the usefulness of this Regulation, particularly if it is not used in conjunction with a more comprehensive solar framework.

Bylaws

The City of Vancouver has passed bylaws designed to facilitate the installation of solar energy systems on rooftops.[259] For example, the city clarified their zoning and development bylaw to allow for discretionary height increases for roof-mounted energy technologies and green roofs. Roof mounted energy technologies are defined as solar PV panels, solar thermal collectors, and wind turbines.[260] Prior to approving a height increase, the Director should first consider the site and size of the technology and the design as it relates to the overall development.[261] This can all be done after a building owner or developer submits an application with a written rationale for the necessary height increase and drawings of the design.[262]

[256] *Solar Hot Water Ready Regulation*, *supra* note 253, s 3(2).
[257] Office of Housing and Construction Standards, "Guide to the Province of BC Solar Hot Water Ready Regulation 2013" *supra* note 255 at 3.
[258] *Solar Hot Water Ready Regulation*, *supra* note 253, s 4.
[259] City of Vancouver, revised by-law, *Zoning and Development Bylaw* (February 1997) s 10.18.5; Community Services, "Roof-Mounted Energy Technologies and Green Roofs (Discretionary Height Increases)" (26 August 2019) Planning – By-law Administration Bulletins online: https://bylaws.vancouver.ca/bulletin/bulletin-roof-mounted-energy-technologies-and-green-roofs.pdf.
[260] *Ibid* at ss 2.1-2.3.
[261] *Ibid* at s 4.
[262] *Ibid* at s 5.

Alternative Energy Sources PST Exemption

British Columbia is the only province which exempts renewable energy equipment from the provincial sales tax. This program results in 7.5% off the final price of solar technology.[263]

This exemption applies to:[264]

- Solar photovoltaic collector panels and wiring, controllers, and devices that convert direct current into alternating current, if they are sold with, and as part of, a system that includes solar photovoltaic collector panels; and
- Solar thermal collector panels and wiring, pumps, tubing, and heat exchangers, if they are sold with, and as part of, a system that includes solar thermal collector panels.

Innovative Clean Energy Fund

The Innovative Clean Energy Fund is funded through a levy imposed on energy sales and is designed to support the clean energy sector, among other environmental goals.[265] Specifically, the Fund has provided $77 million for 62 projects, including solar.[266]

Nova Scotia & Ontario

PACE Program

Nova Scotia

Nova Scotia takes a stream-lined approach to PACE programming by focusing on enabling municipalities to bring forward bylaws to manage program operations. Section 81A of the Nova Scotia *Municipal Government Act* identifies the specific bylaw making powers.

[263] Provincial Sales Tax (PST) Bulletin, "Energy, Energy Conservation and the ICE Fund Tax" (June 2020) 203 Government of British Columbia at 10 online: https://www2.gov.bc.ca/assets/gov/taxes/sales-taxes/publications/pst-203-energy-conservation-ice-fund-tax.pdf.
[264] *Ibid* at 10.
[265] Government of British Columbia, "Innovative Clean Energy (ICE) Fund" online: https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/innovative-clean-energy-solutions/innovative-clean-energy-ice-fund.
[266] Government of British Columbia, "History of the Fund" online: https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/innovative-clean-energy-solutions/innovative-clean-energy-ice-fund/history-of-the-fund.

Section 81A states:

> **81A (1)** The council may make by-laws imposing, fixing and providing methods of enforcing payment of charges for the financing and installation of any of the following on private property with the consent of the property owner:
>
> (a) energy-efficiency equipment;
>
> (b) renewable energy equipment;
>
> (c) equipment for the supply, use, storage or conservation of water; and
>
> (d) on-site sewage disposal equipment.
>
> **(2)** A by-law passed pursuant to this Section may provide
>
> (a) that the charges fixed by, or determined pursuant to, the by-law may be chargeable according to a plan or method set out in the by-law;
>
> (b) that the charges may be different for different classes of development and may be different in different areas of the municipality;
>
> (c) when the charges are payable;
>
> (d) that the charges are first liens on the real property and may be collected in the same manner as other taxes;
>
> (e) that the charges be collectable in the same manner as taxes and, at the option of the treasurer, be collectable at the same time, and by the same proceedings, as taxes;
>
> (f) a means of determining when the lien becomes effective or when the charges become due and payable;
>
> (g) that the amount payable may, at the option of the owner of the property, be paid in the number of annual instalments set out in the by-law and, upon default of payment of any instalment, the balance becomes due and payable; and
>
> (h) that interest is payable annually on the entire amount outstanding and unpaid, whether or not the owner has elected to pay by instalments, at a rate and beginning on a date fixed by the by-law.2012, c. 27, s. 2; 2016, c. 25, s. 2; 2019, c. 19, s. 8; 2019, c. 36, s. 1.

Today, programs are in place in 10 municipalities across the province, seven of which are administered by the Clean Foundation, a not-for profit third-party administrator, and the other three which are administered by the municipalities themselves.[267]

Ontario

Ontario has two PACE programs, both of which are located in Toronto. To implement these programs, changes were made to the *Local Improvement Charges – Priority Lien Status Regulation* under the Ontario *Municipal Act.*[268] Changes to this Regulation allowed municipalities to use local improvement charges ("LIC") to help property owners finance changes to their homes specifically for energy and water consumption. LICs were available prior to this, however, these changes were specific in expanding the program as past LICs were used primarily for upgrading local infrastructure.[269] Specifically, the Regulation allows municipalities to "raise the cost of undertaking works as local improvements on private property by imposing special charges on the lots of consenting property owners upon which all of part of the works are or will be located."[270] 'Works' include "constructing energy efficiency works or renewable energy works."[271]

The United States of America

Solar energy in the United States has a more entrenched role than it does in Alberta, however, it still makes up a small proportion in comparison to other energy sources. For example, in the first half of 2020, only 2.9% of electricity generated in the United States came from solar energy.[272] The following section will highlight some of federal and state level programs designed to regulate and encourage solar energy in the United States.

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[267] Madi Kennedy, Tom-Pierre Frappe-Seneclauze & Betsy Agar, *supra* note 204 at 6.
[268] *Local Improvement Charges – Priority Lien Status,* O. Reg. 586/06 [*Local Improvement Charges – Priority Lien Status*]; *Municipal Act, 2001*, SO 2001, c 25.
[269] Dunsky Energy Consulting, "Local Improvement Charge (LIC) Financing Pilot Program Design for Residential Buildings in Ontario" (June 2013) at 14 online: https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/GenEnergy/Local%20Improvement%20Charge%20Financing%20Pilot%20program%20design%20for%20residential%20buildings%20in%20ontario.pdf.
[270] *Local Improvement Charges – Priority Lien Status, supra* note 268, s 36.1.
[271] *Ibid*, s 1(2)(q).
[272] David Feldman & Robert Margolis, "Q1/Q2 2020 Solar Industry Update" (1 September 2020) *National Renewable Energy Laboratory* at 16 online: https://www.nrel.gov/docs/fy20osti/77772.pdf [David Feldman & Robert Margolis].

Federal Investment Tax Credit for Solar Power

The United States federal investment tax credit for solar power ("ITC") is a dollar-for-dollar federal tax reduction for the construction of residential and utility scale solar photovoltaic projects. In 2005, the ITC gave a 30% tax credit to solar construction projects.[273] This program lasted until January 1, 2020 before ramping down. It will be phased out completely for residential projects by 2022 but a 10% credit will remain for utility scale projects.[274]

In the meantime, projects looking to receive this credit can be declared eligible in one of two ways.[275] The first criteria is physical work completed and requires "physical work of a significant nature" already complete on the project.[276] The test for this criteria looks at the *nature* of the work and not the amount or cost and qualifying physical work can be located either on or off site.[277] The second test is known as the five percent safe harbor test. Projects are eligible if the taxpayer has already spent at least five percent of the project total.[278] In the case where a project exceeds the anticipated cost, the safe harbor test will not be satisfied if it is five percent below the new cost.[279] If the safe harbor test can be satisfied for some, but not all, of the property, the taxpayer can claim property where the five percent safe harbor would be satisfied, leaving out the remainder.[280]

Both tests incorporate a continuity requirement.[281] For the physical work test, the taxpayer must continue construction of a significant nature as determined by relevant facts and circumstances.[282] For the five percent safe harbor test, taxpayers must make 'continuous efforts' demonstrated by activities such as investing more money, obtaining permits, and performing physical work on the PV system.[283] Excusable disruptions are allowable so long as

[273] 26 US Code § 48, online: https://www.law.cornell.edu/uscode/text/26/48.
[274] US Department of Energy, "Homeowner's Guide to the Federal Tax Credit for Solar Photovoltaics," (January 2020), online: https://www.energy.gov/sites/prod/files/2020/01/f70/Guide%20to%20Federal%20Tax%20Credit%20for%20Residential%20Solar%20PV.pdf; US Department of Energy, "Guide to the Federal Tax Credit for Commercial Solar Photovoltaics" (January 2020), online: https://www.energy.gov/sites/prod/files/2020/01/f70/Guide%20to%20the%20Federal%20Investment%20Tax%20Credit%20for%20Commercial%20Solar%20PV.pdf.
[275] IRS Notice 2018-59, "Beginning of Construction for the Investment Tax Credit under Section 48" at 10 online: https://www.irs.gov/pub/irs-drop/n-18-59.pdf.
[276] *Ibid* at 11.
[277] *Ibid*.
[278] *Ibid* at 14-16.
[279] *Ibid* at 16.
[280] *Ibid* at 15.
[281] *Ibid* at 17.
[282] *Ibid*.
[283] *Ibid* at 14-16.

they are beyond the taxpayer's control.[284] Finally, the safe harbor deadline will expire four years after the calendar year in which the construction project began.[285]

Despite representing less than 3% of all energy produced in the United States, solar has grown over 10,000% since the ITC was implemented.[286] Specifically, the ITC is beneficial because it subsidizes the cost of installation, which helps states develop complimentary financial incentives.[287] Although this tax may be coming to a close, some of President Biden's early action suggests that more may be coming. One of President Biden's first moves after inauguration was to pass the "Executive Order on Tackling the Climate Crisis at Home and Abroad" which directs the federal government to:[288]

- work to end international financing of fossil fuels;
- achieve a carbon pollution-free electricity sector by 2035;
- take steps to increase renewable energy production on public lands;
- take steps to ensure that, to the extent consistent with applicable law, federal funding is not directly subsidizing fossil fuels and eliminate fossil fuel subsidies from the budget by 2022; and
- identify opportunities for federal funding in clean energy technologies.

While no specific reference to the ITC is included, there is reference to both clean electricity and to limiting fossil fuel subsidies.

The Federal Housing Authority and PACE loans

The United States has a longer history with PACE programs than Canada and, generally, these programs are managed and orchestrated at the state level. However, certain federal laws still play a role. For example, in December 2017, the Federal Housing Authority ("FHA") announced it would no longer insure mortgages for homes with PACE loans.[289] This decision impacts the ability of a homeowner to transfer a property with a PACE loan to a buyer using a Fannie Mae

[284] *Ibid* at 19.
[285] *Ibid*.
[286] Solar Energy Industries Association, "Solar Investment Tax Credit (ITC)" (April 2018) online: https://www.seia.org/sites/default/files/inline-files/SEIA-ITC-101-Factsheet-2018-June.pdf [Solar Energy Industries Association, "Solar Investment Tax Credit"].
[287] Yan Heng et al., "The Heterogeneous Preferences for Solar Energy Policies Among US Households" (2020) 137 Energy Policy 1 at 2.
[288] The White House Briefing Room, "Executive Order on Tackling the Climate Crisis at Home and Abroad" (27 January 2021) at ss 102(h), 205, 207, 209 & 210 online: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/.
[289] Letter from U.S. Department of Housing and Urban Development (7 December 2017) Mortgagee Letter 2017-18 re: Property Assessed Clean Energy (PACE) online: https://archives.hud.gov/news/2017/17-18ml.pdf.

or Freddie Mac loan.[290] It also limits the ability to transfer the PACE loan and property to buyers with non-FHA mortgages, requiring the buyer and seller negotiate the payoff in the home purchase. It does not, however, prevent a mortgagee with an FHA insured mortgage from receiving a PACE loan after the FHA insurance is already in place.[291]

California

California is one of the U.S. leaders in solar energy installation. Between the second half of 2019 and the first half of 2020 the state's solar energy generation made up 21.7% of total electricity generation.[292] Much of this industry was spurred by the state's first solar mandate, which "require[d] investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33% of total procurement by 2020."[293] This number has since increased to 50% of by 2030.[294]

The following section will highlight some of the main pieces of legislation that make up California's solar energy program.

California's Renewable Portfolio Standard

The Renewable Portfolio Standard ("RPS") requires the California Public Utilities Commission to focus energy procurement decisions on the reduction of GHGs by 60% by 2030.[295] This program sets escalating renewable energy procurement requirements for the state's load-serving entities.[296] The program's goals have increased, moving from an initial goal of 33% by 2020 to the current goal of 60%. Retail sellers can use a mix of renewable energy types including solar PV and solar thermal to hit these targets.

[290] Fannie Mae and Freddie Mac are federal programs designed to buy mortgages from lenders and either hold these mortgages in their portfolios or package the loans into mortgage-backed securities that may be sold. Check out this site to learn more: https://www.fhfa.gov/SupervisionRegulation/FannieMaeandFreddieMac/Pages/About-Fannie-Mae---Freddie-Mac.aspx.
[291] Federal Register: The Daily Journal of the United States Government, Notice and Request for Input from the Federal Housing Finance Agency "Property Assessed Clean Energy (PACE) Program" (16 January 2020) at 2739 online: https://www.federalregister.gov/documents/2020/01/16/2020-00655/property-assessed-clean-energy-pace-program#h-12.
[292] David Feldman & Robert Margolis, *supra* note 272 at 14.
[293] Cameron Hughes et al., "Earth, Wind, and Fire: Power Infrastructure in Alberta's New Age" (2017) Alberta Law Review 439 at 471 [Cameron Hughes et al.].
[294] Edwin Kisiel, "Solar Panels in Condominium Communities" LSU Journal of Energy law and Resources, Volume VIII, Issue 1 (Fall 2019) 207 at 210 [Edwin Kisiel].
[295] State of California, SB-100 California Renewables Portfolio Standard Program: emissions of greenhouse gases (2017-2018).
[296] California Energy Commission, "Renewables Portfolio Standard – RPS" online: https://www.energy.ca.gov/programs-and-topics/programs/renewables-portfolio-standard.

Only facilities certified by the California Energy Commission can take part and the California Public Utilities Commission implements and administers compliance rules for retail sellers of electricity.[297] Enforcement procedures are set out in Regulation and include requirements for public operator utilities ("POUs").[298] For example, the Regulation requires all POUs to adopt a renewable energy resource procurement plan and an enforcement program which details the actions required of the POU if they will not meet the RPS procurement target.[299] While compliance measures are set out in the event that POUs do not meet the procurement requirements, they are optional.[300] Additionally, POUs must meet certain reporting standards including submitting annual reports to the Commission with information on their annual progress and future plans to continue towards their RPS procurement requirements.[301]

The Commission must also report annually to the state legislature on the progress of the RPS goals and substantive actions.[302] Specifically, reports must include cost savings procured by the RPS program and the program's progress and status.[303] Further enforcement is available through a complaint process. Complaints can be filed against a POU pertaining to the enforcement of an RPS requirement or any regulation, order, or decision adopted by the Commission pertaining to the RPS.[304]

The California Solar Initiative is a state-wide program which enables the allocation of approximately $2 billion to small scale energy projects through consumer rebates; expanded net metering; and new home mandates. The program's objective is to install one million solar energy systems on homes or produce 3,000 MW of solar electric power. Funds can be used to install solar on existing homes and existing or new commercial, agricultural, government, and non-profit buildings. The program awards different incentives taking into account factors such as installation angle, tilt, and location. To read more about the program go to Go Solar California.

[297] *Ibid*.
[298] California Code of Regulations, *Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly Owned Electric Utilities*, (April 2016) [*Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly Owned Electric Utilities*].
[299] *Ibid*, ss 3205(a) & (b).
[300] *Ibid*, s 3206.
[301] *Ibid*, s 3207.
[302] California Public Utilities Commission, "2020 California Renewables Portfolio Standard Annual Report" (November 2020) online: https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/2020%20RPS%20Annual%20Report.pdf.
[303] California Public Utilities Commission, "Reports and Data" online: https://www.cpuc.ca.gov/RPS_Reports_Data/.
[304] *Enforcement Procedures for the Renewables Portfolio Standard for Local Publicly Owned Electric Utilities*, *supra* note 298, s 3208.

California Solar Rights Act

The *California Solar Rights Act* creates a legal framework for solar access in the state. This Act was passed in its initial form in 1978 and was designed to provide homeowners with some assurance that neighbours could not interfere with their use of solar energy.[305] The Act uses several tools including limiting the use of restrictive covenants and other restrictions over solar energy systems.[306]

Specifically, the Act limits the ability of homeowner associations ("HOAs")[307] to restrict solar energy system installations 'unreasonably'. [308] The term 'unreasonable' is defined as "[a]ny covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument affecting the transfer or sale of, or any interest in, real property . . . that effectively prohibits or restricts the installation or use of a solar energy system."[309]

The Act provides some allowance for restrictions on solar energy systems so long as they do not "significantly" increase the cost of the system or decrease its efficiency or performance.[310] Specifically, restrictions cannot increase the cost of a solar energy system by more than 10% or $1,000 or decrease the system's efficiency by more than 10%.[311] The Act does allow restrictions in some instances such as in common areas; with prior approval; and to ensure proper maintenance and repair.[312]

Solar easements

The *California Solar Rights Act* recognizes a solar easement as a legal tool.[313] Solar easements are legal tools homeowners can use to ensure they receive sufficient sunlight to provide their solar energy system with proper insolation to function.[314] While easements can be negotiated on an individual basis, the *California Government Code* provides local governments the ability to require solar easements in subdivision developments.[315] The legislative body for a city or county can require certain subdivisions, by ordinance, to create solar easements that ensure each parcel has the right to receive sunlight across adjacent parcels or units in the

[305] *California Solar Rights Act, supra* note 226.
[306] Scott Anders et al., "California's Solar Rights Act: A Review of the Statutes and Relevant Cases" (December 2014) Energy Policy Initiatives Center: University of San Diego School of Law at 2-3 online: https://www.sandiego.edu/law/documents/centers/epic/Solar%20Rights%20Act-A%20Review%20of%20Statutes%20and%20Relevant%20Cases.pdf.
[307] Homeowner Associations are the community groups in charge of developments or condominium corporations.
[308] California Civil Code § 714 & 714.1.
[309] *Ibid*, ss 714 & 714.1.
[310] *Ibid*, ss 714(d)(1)(A) & (B).
[311] *Ibid*, ss 714(d)(1)(A) & (B).
[312] *Ibid*, ss 714.1(a) – (d).
[313] *Ibid*, ss 801 & 801.5; Law Reform Commission of Saskatchewan, *supra* note 225, at 8.
[314] Edwin Kisiel, *supra* note 294 at 211.
[315] California Government Code § 66475.3 [California § 66475.3].

subdivision.[316] These provisions are intended to relieve the burden on individual households who may otherwise be required to negotiate their own easements.

Scope of application

For the purposes of the Act, a solar energy system is defined as any solar collector or other solar energy device or any structural design feature of a building whose primary purpose is to provide for the collection, storage, and distribution of solar energy for space heating, cooling, electric generation, or water heating.[317] More recently, the Act was amended to provide rules specific to condominium associations.[318]

California Solar Shade Control Act

The *Solar Shade Control Act* provides limited protection to solar energy system owners from shading caused by trees and shrubs on adjacent properties.[319] In this Act a solar easement is defined as the "right of receiving sunlight across real property of another for any solar energy system."[320]

The *Solar Shade Control Act* restricts the shading of solar energy systems by trees and shrubs by 90% between the hours of 10:00 a.m. and 2:00 p.m. Notably, the Act only applies to growth that occurs one year after a solar energy system is installed, meaning trees that cast a shadow on the energy system at the time of installation or within one year of construction are exempt.[321] For clarity, the Act specifies that "any instrument creating a solar easement" must, at a minimum, include all of the following:[322]

- a description of the dimensions of the easement expressed in measurable terms;
- any restrictions that would impair or obstruct the passage of sunlight through the easement; and
- the terms or conditions, if any, under which the easement may be revised or terminated.

[316] *Ibid*.
[317] California Civil Code § 801.5 & 801.5(a).
[318] Edwin Kisiel, *supra* note 294 at 212.
[319] California Civil Code § 801 & 801.5.
[320] *Ibid*, ss 801 & 801.5.
[321] Law Reform Commission of Saskatchewan, *supra* note 225 at 8.
[322] California Civil Code § 801.5(b).

The Act is further limited in scope by restricting only those shadows cast by trees and shrubs upon 'active' solar systems. This means shadows cast upon windows and walls of 'passive' solar homes are not applicable.[323]

California Feed-in Tariff

The California FIT program for small scale renewable energy projects allows eligible customer-generators to enter into 10-, 15-, or 20-year standard contracts with their utility companies to sell the electricity produced by small renewable energy systems (up to 3MW) at time differentiated, market-based prices.[324] Payment rates can be adjusted based on the value of every kWh of electricity generated on a time-of-delivery basis.[325]

Additionally, all investor owned and publicly owned utilities with 75,000 or more customers must make a standard FIT available to their customers.[326]

California PACE Program

California has a mature PACE program allowing property owners to install clean energy upgrades on their property and repay them through property taxes.[327] PACE loans are considered a priority and assessments are intended to survive foreclosure in a position senior to the first mortgage.[328]

Bill AB-1284 established new underwriting standards for the program and was designed to evaluate whether a property owner has the ability to pay for their annual PACE obligation.[329] This Bill also strengthened the standards based on home equity and on-time mortgage and tax payment history.[330] Similar provisions were legislated in SB-242 which requires PACE administrators to call property owners and confirm that the property owner understands, acknowledges, and agrees to the key terms of their PACE financing agreement.[331] SB-242 creates a right to cancel after signing, prohibits program administrators from paying 'kickbacks'

[323] Frank G. Bennett, "Legal Protection of Solar Access under Japanese Law" (1986) 5 UCLA Pac Basin LJ 107 at 109.
[324] State of California, SB-32: Renewable electric generation facilities (2009-2010) ss 387.6(b)(1), 399.20(d)(1).
[325] *Ibid,* s 399.20(d)(2).
[326] David Grinlinton & LeRoy Paddock, "The Role of Feed-in Tariffs in Supporting the Expansion of Solar Energy Production" (2010) 41:4 University of Toledo Law Review 943 at 969 – 971 [David Grinlinton & LeRoy Paddock].
[327] Emily Martin Fadrhonc, et al., "Residential Property Assessed Clean Energy in California" (January 2016) Berkeley Lab Electricity Markets & Policy Group Technical Brief at 2 online: https://emp.lbl.gov/sites/all/files/lbnl-1003964.pdf.
[328] *Ibid* at 2.
[329] State of California, AB-1284 California Financing Law: Property Assessed Clean Energy program: program administrators (2017-2018).
[330] *Ibid*.
[331] State of California, SB-242 Property Assessed Clean Energy program: program administrator (2017-2018).

to contractors and from giving incentives to property owners, and establishes a data monitoring program.[332] The purpose of these amendments was to strengthen protections for property owners.

With this established legislated framework, private PACE financing has taken off, funded primarily by the California Statewide Communities Development Authority ("CSCDA").[333] This program finances eligible projects through the issuance of bonds backed by assessments under the Open PACE program.[334] This program is designed to bring multiple PACE programs together to increase competition for homeowners' business and multiple cities and counties can become members.[335]

Wisconsin

Wisconsin may not be the first place you think of when you imagine solar but, in fact, Wisconsin has a history of solar access dating back to the 1980s. The following section will highlight some of the programs currently in place in the state of Wisconsin.

Wisconsin Solar Rights Law

Solar access law in Wisconsin first took shape in 1982 when the Wisconsin Supreme Court released their judgment in the case of *Prah v Maretti*.[336] At issue in this case was whether private nuisance law protects the owner of a solar energy system when the owner's access to sunlight is jeopardized by proposed construction on a neighbouring property.[337] In their decision, the Court held that private nuisance law was an appropriate means of regulating access to sunlight, thereby creating a solar access right and establishing opportunities for future solar protection in the state.[338] In doing so, the Court noted that while landowners once had the right to use their property as they desired so long as they inflicted no *physical* damage onto their neighbours, sunlight was becoming a valuable access right and these standards would need to change.[339] The Court concluded that encouraging the use of solar energy was becoming more of a legislative policy, ruling that allowing private nuisance law in this instance promotes

[332] *Ibid*.
[333] California Statewide Communities Development Authority, "Home" online: http://cscda.org/.
[334] Madi Kennedy, Tom-Pierre Frappe-Seneclauze & Betsy Agar, *supra* note 204 at 19-20.
[335] *Ibid* at 19-20.
[336] *Prah v Maretti,* 108 Wis 2d 223, 321 NW 2d 182 (1982).
[337] *Ibid.*
[338] Michael G McQuillen, "Prah v. Maretti: Solar Rights and Private Nuisance Law" (1983) 16:2 John Marshall L Rev 435 at 435.
[339] *Ibid* at 439.

the reasonable use and enjoyment of land in modern society.[340] This was the first time a Wisconsin Court recognized damages flowing from blocking sunlight, without any malicious intent.[341]

Later, Chapter 844 of the Wisconsin Statute codified private nuisance stating, "any structure that is constructed or vegetative growth that occurs on adjoining or nearby property after a solar energy system … is installed on any property, that interferes with the functioning of the solar or wind energy system, is considered to be a private nuisance."[342] Chapter 700 of the Wisconsin Statute also recognizes a renewable energy easement. This form of easement "limits the height or location, or both, of permissible development on the burdened land in terms of a structure or vegetation, or both, for the purpose of providing access for the benefited land to wind or sunlight passing over the burdened land."[343] The Act states that the owner of a solar energy system is entitled to receive damages, court costs, and reasonable attorney fees from any person who causes an obstruction of their solar energy system.[344]

Finally, Wisconsin has a *Solar Access Regulation*. This Regulation is devised to protect solar energy systems from obstruction by prohibiting municipalities from placing restrictions on the installation or use of solar energy systems unless the restriction is required to preserve or protect public health or safety; does not significantly increase the cost of the system or significantly decrease its efficiency; or allows for an alternative system of comparable cost and efficiency.[345] For example, the Regulation authorizes a municipal district to enact ordinances relating to the trimming of vegetation that blocks solar energy from reaching a solar energy system. There are restrictions, however, as the ordinance may not require the trimming of vegetation planted prior to the installation of the solar energy system.[346]

Wisconsin's PACE Program

In 2009, the Wisconsin State Assembly authorized municipalities and counties to help residential property owners finance energy efficiency improvements through a PACE program.[347] This Bill authorized local governments to assess special charges for services including the authority to assess charges for PACE loans.[348] An accompanying Senate Bill

[340] *Ibid* at 440.
[341] *Ibid* at 443.
[342] Wisconsin Statute § 844.22, s 22.
[343] Wisconsin Statute § 700.35.
[344] Wisconsin Statute § 700.41, s 3.
[345] Wisconsin Statute § 66.0401, s 1m.
[346] *Ibid*, s 2.
[347] State of Wisconsin, 2009 Assembly Bill 255 (2009-2010), s 66.0627(8).
[348] *Ibid*, s 66.0627(8).

expanded the program even further to include commercial property owners and to allow for third party financing.[349] The two programs are known as R-PACE and C-PACE, respectively.

The PACE Programs are administered by PACE Wisconsin – a non-profit organization, which provides a statewide approach, a centralized program administrator, and eliminates program costs for local governments.[350]

Community Solar in Wisconsin

Community-based energy systems in Wisconsin are defined in statute as "a small-scale energy production system or device which serves a local area of portion thereof, including, but not limited to, a small-scale power plant using… sun… or other form of energy."[351] The statute also requires municipal electric companies to consider energy conservation measures and the development of efficient, community-based energy systems in their electricity deployment program.[352]

In 2019, the Wisconsin Public Service Commission approved community solar programs for both Madison Gas & Electric and Alliant Energy. The Madison Gas & Electric shared solar program allows eligible owners to buy into a 5MW solar energy system owned and operated by Madison Gas & Electric. Customers, both residential and commercial, can buy shares in the solar energy system and pay a rate of 10.9 cents per kWh.[353] The program allows customers who may not own property, who live in a multi-family dwelling, or who choose not to have solar on their property to participate in a shared solar community.[354] Similarly, the Alliant Energy program allows individuals or businesses to purchase shares in a local solar energy program.[355]

[349] 2009 Wisconsin Act 272 (10 May 2010) online: http://docs.legis.wisconsin.gov/2009/related/acts/272.pdf.
[350] PACE Wisconsin, "Local Government" (2019) online: https://www.pacewi.org/local-governments.html.
[351] Wisconsin State Regulation § 66.0825, s 3(am).
[352] *Ibid*, s 6m.
[353] Madison Gas & Electric, "Shared Solar Program" (2020) online: https://www.mge.com/our-environment/green-power/solar-power/shared-solar-program.
[354] Public Service Commission of Wisconsin, "Application of Madison Gas and Electric Company, as an Electric Public Utility, Dane County, Wisconsin, for Approval to Provide an Expansion and Modification of its Shared Solar Program" (30 July 2019) 3270-TE-104.
[355] Alliant Energy Community Solar, "How it works" online: https://www.alliantenergy.com/InnovativeEnergySolutions/SustainableEnergyChoices/CommunitySolar.

Wisconsin's Municipal Programs

Wisconsin has a number of municipal solar programs including:

- Milwaukee Shines: The City of Milwaukee passed a solar zoning ordinance including a financing option for solar energy projects. As of January 2020, the municipality reported more than 4.5 MW of capacity in installed solar energy. This zoning system was modeled after the state solar access law; [356] and

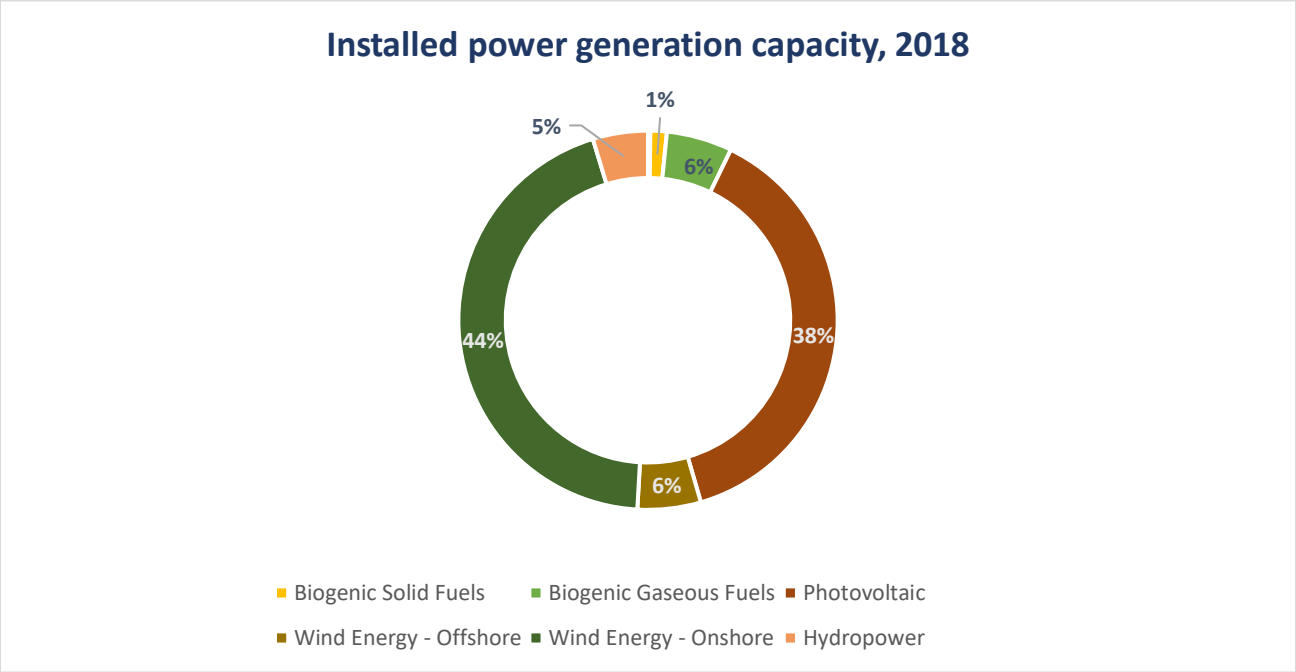
- Renewable Rewards Program: The Renewable Rewards Program is a partnership between 'Focus on Energy' and Wisconsin Utilities designed to offset solar installation costs through cash-back rewards for solar electric systems.[357]

Germany

Germany is one of the world leaders in solar energy installation. By 2019, renewable electrical generation capacity in the country had reached 43% of electrical capacity with 38% coming from solar PV systems, satisfying 8.2% of gross electrical consumption.[358] During the same period, the nominal output of installed solar PV systems was approximately 49 GW.[359] Going forward, Germany has even higher goals, working to raise the proportion of electricity supplied by renewable energy to 40-45% in 2025 and 55-60% by 2034.[360] Solar thermal energy has also increased, with 8,877 GWh of capacity installed in 2018.[361]

[356] Milwaukee Environmental Collaboration Office, "Welcome to Milwaukee Shines!" (2020) online: https://city.milwaukee.gov/MilwaukeeShines#.XoUGa9NKhhE.
[357] Focus on Energy: Partnering with Wisconsin Utilities, "Renewable Rewards Program" online: https://focusonenergy.com/residential#program-renewable-energy.
[358] Dr. Harry Wirth, "Recent Facts about Photovoltaics in Germany" (26 March 2020) *Fraunhofer ISE* at 5 online: https://www.ise.fraunhofer.de/content/dam/ise/en/documents/publications/studies/recent-facts-about-photovoltaics-in-germany.pdf [Dr. Harry Wirth].
[359] *Ibid* at 5; Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018" (2019) Government of Germany at 11 online: https://www.bmwi.de/Redaktion/EN/Publikationen/renewable-energy-sources-in-figures-2018.pdf?__blob=publicationFile&v=2 [Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018"].
[360] Federal Ministry for Economic Affairs and Energy, "Renewable Energy" (2020) Government of Germany online: https://www.bmwi.de/Redaktion/EN/Dossier/renewable-energy.html.
[361] *Ibid* at 18.

Figure 4: German installed power generation capacity in 2018[362]



According to the German government this expansion into renewable energy use has eliminated approximately 187 million tonnes of $C0_2$.[363] The following section will outline how Germany has encouraged this investment and German laws regulating solar energy.

Germany's *Renewable Energy Sources Act*

German solar regulation is centred around the *Erneuerbare-Energien-Gesetz* ("EEG") (referred to in English as the *Renewable Energy Sources Act*). This Act was first introduced in 2000, with major amendments in 2014 and 2017 and is focused on expanding renewable energy across the country. The Act is built upon the core elements of feed-in tariffs ("FIT") for renewable electricity and priority green electricity on the grid with the overall aim of developing the energy supply in a sustainable manner. It aims to do so through an increase in the proportion of renewable electricity (including solar) to at least 80% by 2050.[364]

[362] Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018" *supra* note 359 at 14.
[363] *Ibid* at 24.
[364] *Renewable Energy Sources Act*, (July 2017) ss 1 & 3, Non-Official English Version online: https://www.bmwi.de/Redaktion/EN/Downloads/renewable-energy-sources-act-2017.pdf%3F__blob%3DpublicationFile%26v%3D3 [*Renewable Energy Sources Act*].

The FIT portion of the EEG is designed to increase the amount of renewable energy on the grid. Initially, it guaranteed the owners of renewable energy installations a set, above-market price per kWh for the power they fed onto the grid, over a period of 20 years.[365] Compensation rates for electricity produced by solar PV ranged from 45.7c (Eurocents) for large capacity open-space solar power plants to 57.4c for plants installed on a building and with a capacity of less than 30 kW at their peak.[366]

In 2012, the FIT program was replaced by a floating market premium model which enabled operators to sell electricity on the wholesale market while receiving the difference between the applicable reference price and the average price for electricity on the spot market of the German electricity exchange.[367] By 2017, solar projects with a capacity of 750 kW or more only received subsidized energy prices *after* a tender process had occurred.[368] Despite this change, solar facilities with a capacity lower than 750 kW were still eligible for the FIT program.[369]

The German FIT program has been praised for having the characteristics often associated with a successful FIT program including: [370]

a) predictability;
b) a cost-based framework based upon the actual costs of renewable energy generation; and
c) tariff prices differentiated based on the technology, project size, location, and resource quality.

This initial financial support helped to establish a strong solar market in Germany by lowering costs and establishing certainty. Since then, some of these supports have been eliminated leaving more up to the markets. This signals the success of a program designed to ensure a continuous reduction in costs. [371]

[365] David Grinlinton & LeRoy Paddock, *supra* note 326 at 949 – 950.
[366] *Ibid* at 949 – 950.
[367] Kerstine Appunn, "Defining features of the Renewable Energy Act (EEG)" (8 October 2014) *Clean Energy Wire* online: https://www.cleanenergywire.org/factsheets/defining-features-renewable-energy-act-eeg.
[368] International Energy Agency, "2017 Amendments of the Renewable Energy Sources Act (EEG 2017)" (27 September 2016) online: https://www.iea.org/policies/6125-2017-amendment-of-the-renewable-energy-sources-act-eeg-2017.
[369] Cameron Hughes et al., *supra* note 293 at 467.
[370] Ivan Lieben & Ian Boisvert, "Making Renewable Energy FiT: A Feed-in-Tariff Certifying Body Could Accelerate Renewable Energy Deployment in the United States" (2012) 52:1 Nat Resources J 157 at 182 – 183.
[371] Dr. Harry Wirth, *supra* note 358, at 7.

Renewable Energy Surcharge

The EEG renewable energy surcharge helps to finance the prices guaranteed under the FIT. In other words, the surcharge represents the amount between the wholesale market price for electricity and the higher price guaranteed to renewable energy operators under the FIT, determined on a yearly basis.[372] The surcharge is required for all electricity consumers with the notable exception of certain industries including: railways, those that use a lot of electricity or face significant international competition, and self-powered small-scale power plants.[373] Determining the yearly EEG amount consists of three components:[374]

a) the projected level of financing for renewable energy in the upcoming calendar year;
b) a liquidity reserve to cover future forecast errors; and
c) an account settlement charge to offset past forecast errors.

The surcharge has increased over the last few years – jumping from 0.19 c/kWh in 2000 to 6.41c/kWh in 2019.[375] These rising costs mean that today, the EEG makes up a larger proportion of the retail electricity price. Despite this, the government considers the EEG surcharge to be a "compulsory contribution towards the 'necessary and approved energy transformation'."[376] While the EEG may be necessary to supplement the FIT, the cost highlights one of the critiques of FIT programs – that the costs of renewable energy guarantees are too high.[377]

However, as electricity prices on the exchange rise in conjunction with the low cost of new installations, the EEG surcharge is predicted to decline. Additionally, the introduction of auctions in 2017 means that the level of FIT for new renewable projects is determined via competitive auction rather than a government set rate, lowering the cost of the surcharge.[378]

[372] Calculated every 15th of October for the following year.
[373] Federal Ministry for Economic Affairs and Energy, "Renewable energy surcharge stabilises" (25 January 2018) *Energiewende Direkt* online: https://www.bmwi-energiewende.de/EWD/Redaktion/EN/Newsletter/2018/01/Meldung/topthema.html.
[374] Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018" *supra* note 359 at 29-30.
[375] Clean Energy Wire, "EEG-Surcharge 2017" (14 October 2016) *Clean Energy Wire* online: https://www.cleanenergywire.org/news/germany-set-miss-climate-goals-think-tank/eeg-surcharge-2017. For announcement in German: https://www.netztransparenz.de/EEG/EEG-Umlagen-Uebersicht.
[376] Dr. Harry Wirth, *supra* note 358, at 19.
[377] Thomas Brunn & Roman Sprenger, "The Reform of the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz/EEG) 2014 in Germany" (2014) 5:1 Renewable Energy L & Policy Rev (RELP) 26 at 26.
[378] Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018", *supra* note 359 at 29-30.

German Priority for Renewables

The EEG guarantees renewable energy projects access to the grid by requiring network operators give priority to renewable energy in the connection and transmission of electricity.[379] Specifically, the Act requires network operators connect their grids to renewable energy installations first.[380] Network operators are also required to accept, transport, and distribute this electricity prior to electricity derived from fossil fuel or nuclear energy.[381] These provisions ensure that utility companies are not the limiting factor for renewable energy production and transmission.

German Funding for Landlord-Tenant Electricity

A major amendment to the EEG came in 2017 and one new tool was the creation of a funding program for landlord-tenant electricity. Until 2017, homeowners were the main beneficiaries of programs encouraging rooftop solar installation. This program applied to electricity generated by a solar installation on the rooftop of a residential building that is passed on to final consumers (tenants) living within the building or a nearby building.[382] The program was designed to reduce tenants' electricity fees while ensuring it provides benefits attractive to landlords.[383] In cases where tenants cannot use all of the electricity generated, the surplus electricity is fed onto the public grid and landlords are paid the FIT price.[384]

To make the program more attractive to landlords, certain costs such as grid charges, grid surcharges, electricity taxes and concession fees were eliminated.[385] In addition, a bonus is generated for every kWh of landlord-to-tenant electricity.[386] This premium is calculated based on the amount of the statutory FIT as set out in the EEG, minus a deduction. The amount of funding that landlords will receive depends on the size of the solar installation and the national PV expansion rate. When the landlord-to-tenant electricity model was introduced, the amount was between 3.8 ct/kWh for small PV systems and 2.6 ct/kWh for larger PV installations but has

[379] Volker Oschmann, "A Success Story - The German Renewable Energy Act Turns Ten" (2010) 1:1 Renewable Energy L & Policy Rev 45 at 45 [Volker Oschmann]; *Renewable Energy Sources Act*, *supra* note 364 at s 8.
[380] Volker Oschmann, *supra* note 379 at 45; *Renewable Energy Sources Act*, *supra* note 364 at s 8.
[381] Volker Oschmann, *supra* note 379 at 45; *Renewable Energy Sources Act*, *supra* note 364 at s 12.
[382] Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018", *supra* note 359 at 7.
[383] *Ibid* at 8.
[384] *Ibid* at 28.
[385] *Ibid* at 7.
[386] *Ibid* at 7-8.

since dropped.[387] The program has not been as successful as anticipated and by 2019 only 435 PV systems with 9.5 MW cumulative power had been installed, less than expected.[388]

Renewable Energies Heat Act

The *Renewable Energies Heat Act* is another tool in Germany's push towards increased renewable energy. This Act was entered into force on January 1, 2009 and aims to increase the share of renewable energy in heat provision to 14% by 2020.[389] For example, section 3 of the Act requires a certain proportion of all heat supplied to new buildings come from renewable energy.[390]

In conjunction with this Act, the Market Incentive Programme is a funding programme originating with the Federal Ministry for Economic Affairs and Energy which provides incentives to make use of renewable energy to generate heat.[391] This Programme provides grants for upgrades to heating systems, including solar thermal energy.[392]

Citizen Energy and Cooperatives in Germany

In Germany, both community solar programs and energy co-ops play a role in the renewable energy sector. The German term for these programs is Buergerenergie or 'citizen energy' which describes formal, financial, and political participation by citizens.[393] Citizen energy includes direct participation such as through an energy co-op and indirect participation such as through shares in a larger community solar program.

Co-ops are a specific organization type defined by the International Cooperative Alliance as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled

[387] *Ibid* at 29.
[388] A. Jager-Waldau, "JRC Science for Policy Report: PV Status Report 2019" (2019) *European Commission* at 18 online: https://ec.europa.eu/jrc/sites/jrcsh/files/kjna29938enn_1.pdf; En:former, "Landlord-to-tenant electricity: The energy transition heads into homes" (16 September 2019) online: https://www.en-former.com/en/landlord-to-tenant-electricity/.
[389] International Energy Agency, "Renewable Energies Heat Act" (5 November 2017) IRENA Renewables Policies Database online: https://www.iea.org/policies/1526-renewable-energies-heat-act.
[390] Federal Ministry for Economic Affairs and Energy, "Renewable energy sources in figures: National and International Development, 2018", *supra* note 359 at 36.
[391] *Ibid* at 36 – 37.
[392] *Ibid* at 36 – 37.
[393] Lekha Sridhar, "Citizen Energy and Public Participation in Germany's Energiewende: Lessons for Developing Countries" (2016) *UfU Paper 02/2016* at 7 online: https://www.ufu.de/wp-content/uploads/2016/10/UfU-Paper_2-2016_Sridhar.pdf [Lekha Sridhar].

enterprise."[394] In 2006, the German *Cooperatives Law* was passed, facilitating the establishment of new co-ops.[395] Following this change, many energy co-ops were established, basing their business model on the new *Cooperatives Law* and the guaranteed renewable energy FIT.[396] This combination was a boon for new co-ops with 150 energy co-ops founded in 2012 and 129 in 2013.[397] However, more recent changes to the FIT, including the competitive auction process has affected co-ops as only 54 were founded in 2014 and 40 in 2015.[398] By 2016 there were 900 established renewable energy co-ops in Germany.[399]

Another version of citizen energy in Germany is the "remunicipalisation" of the electricity grid. Remunicipalisation refers to the process of a community buying back the electricity grid from utility companies.[400] Much of the push for remunicipalisation arose from the disconnect between citizen support for renewable energy and the lack of action on behalf of utility companies to decarbonize the grid. In response to these concerns, a number of communities have submitted their own bids for control over the utility grid.[401]

For example, in Berlin, a citizen group put forward a bid to buy back the city's utility grid from Vattenfal (a utility company). While the final referendum was unsuccessful, observers pointed out that even a discussion of remunicipalisation in Berlin would have been unheard of a few years prior.[402] Hamburg, on the other hand, was successful in the remunicipalisation of their electricity grid after a 2013 referendum which won with a narrow margin of 50.9%.[403] After the referendum results, the City of Hamburg began negotiations to re-purchase the energy distribution networks.[404]

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[394] International Co-operative Alliance, "Definition of a Cooperative" online: https://www.ica.coop/en/cooperatives/cooperative-identity.
[395] B. Klagge & T. Meister, "Energy cooperatives in Germany – an example of successful alternative economies?" (29 January 2018) 23:7 Local Environment 697 at 699.
[396] *Ibid* at 699.
[397] *Ibid* at 699.
[398] *Ibid* at 699.
[399] Lekha Sridhar, *supra* note 393 at 8.
[400] Kurt Berlo, Wolf Templin & Oliver Wagner, "Remunicipalisation as an Instrument for Local Climate Strategies in Germany: The Conditions of the Legal Energy Framework as an Obstacle for the Local Energy Transition" (2016) 7:2 Renewable Energy L & Policy Rev (RELP) 113 at 114.
[401] Lekha Sridhar, *supra* note 393 at 12-13.
[402] Soren Becker, "Our City, Our Grid: The energy municipalisation trend in Germany" (20 February 2019) People Over Profit at 124 online: https://www.tni.org/files/publication-downloads/chapter_8_reclaiming_public_services_2908.pdf; Lekha Sridhar, *supra* note 393 at 12-13.
[403] World Future Council, "Energy remunicipalisation: How Hamburg is buying back energy grids" (19 October 2016) online: https://www.worldfuturecouncil.org/energy-remunicipalisation-hamburg-buys-back-energy-grids/.
[404] *Ibid*.

Part 4: Regulatory and Policy Changes to Foster Solar in Alberta

A road forward for solar in Alberta will require barriers to solar energy generation to be minimized and, where possible, fully eliminated. Some of these barriers are technical, some practical, and some regulatory. Part 4 focuses on regulatory approaches to encourage rapid and efficient deployment of solar energy projects. Table 3 below sets out the barriers to efficient solar energy deployment and the regulatory or policy responses.

Table 3: Barriers to the efficient adoption of solar energy and policy responses for Alberta

Barrier	Regulatory or policy response
Conflicting land use priorities	Integrated planning for renewable development
Legal uncertainty around access to light	Solar easements Integrated planning for renewable development Solar covenants for new development
Solar readiness of building stock	Building code reform Municipal bylaws
Load and storage challenges	Integrated renewable planning
Financial impediments	Policy support for community and coop generation Reforming the *Municipal Government Act* to streamline the property assessed clean energy programs (Alberta's clean energy improvement tax) Feed-in tariff, renewable portfolio standard and other large-scale incentives

Conflicting Land Use Priorities and Integrated Planning

Land use objectives will vary depending on the nature of the land and are a focal concern of longer-term municipal planning. In addition, land use and siting issues should recognize other federal, provincial, and municipal land use objectives, such as the protection of species at risk and environmentally significant areas. Conflicts may arise in solar energy siting decisions when the 'best' location for a solar energy project overlaps with other land uses such as species at risk habitat. Planning should attempt to mitigate these conflicts.

Municipal Planning

In Alberta, land use planning decisions for land within a municipality are set out in land use bylaws authorized under the *Municipal Government Act* ("MGA").[405] The MGA delegates authority over the regulation and control of land use and development to municipalities and despite setting out some requirements for a valid land use bylaw, it leaves most land use planning decisions up to individual municipalities.[406] However, AUC licences, permits, approvals, or authorizations, prevail over a municipal plans, bylaws and authorizations.[407] If a solar energy system receives an AUC approval, the municipality may be required to amend their planning documents and bylaws to ensure consistency with the AUC decision.

Planning can also be used to ensure future homes and neighbourhoods are built solar compatible. This could be done through a solar zone which sets limits on building height. For example, zoning for new developments could ensure that new houses are solar compatible with proper roof lines and home orientation. A municipality can designate certain areas as solar zones and set development requirements such as height, grade, set-back, and lot coverage.[408] Development permits that do not abide by the same can be refused.[409] Currently, houses are not necessarily being built with solar compatibility in mind and this was not a priority for houses

[405] *Municipal Government Act*, *supra* note 196, s 639.
[406] *Ibid*, s 640.
[407] *Ibid*, ss 619(1) & 620.
[408] Ronald M. Khrulak, *supra* note 238 at 12.
[409] *Ibid* at 12.

in the past. For example, data from 2014 shows that, at the time, only 30% of Edmonton homes were solar compatible.[410]

Some municipalities have already done this. The Town of Millet enacted Land Use Bylaw 8.8(4) which guarantees a right to sun and states that "no development permit shall be issued for the construction or enlargement of any structure which would significantly reduce the amount of sunlight falling on any solar radiation collector system which is complete or under construction at the time of application for that development permit."[411] This effectively guarantees access to solar energy for those individuals who choose to install a solar energy system on their property. This is an interesting combination of solar access laws, zoning laws, and permitting processes in an attempt to streamline the process of installing a solar energy system.

Utility Scale Solar Energy Systems

Despite having important environmental benefits, large-scale solar installations are land intensive and should be developed in areas where they will have the least detrimental effects on the environment. For example, one consideration for more rural areas is to ensure land use or zoning requirements allow solar projects as close to substations, buildings, or other installations as possible to enable construction on brownfields or otherwise already disturbed lands. An example of this balance can be found in the Alberta Utilities Commission decision about the Coaldale Solar Project. In that application, the project proponent Acestes Venture Ltd. ("Acestes") required a change in the existing land-use bylaw to allow development in the proposed area, which the municipality had identified as having agricultural value. Acestes indicated to the AUC that they would work with the County to amend the existing land use bylaw to better accommodate solar projects and re-apply once the amendment had been completed.[412]

In this decision, the AUC acknowledged that while they must regard the land use regime in place when making a decision, they must also ensure that approvals fulfill the objectives of their governing legislation.[413] In considering environmental effects, the AUC concluded that the approval of the project on the location selected by Acestes was in the public interest and

[410] C3 – Energy. Ideas. Change., "Edmonton's Energy Transition Plan 2.3.5. New Buildings – Solar Ready" (31 January 2014) City of Edmonton at 2 online: https://www.edmonton.ca/city_government/documents/PDF/Report_4_-_Solar_Ready_Buildings.pdf [C3 – Energy. Ideas. Change].
[411] Town of Millet, revised by-law #2011/05, Land Use By-Law s 8.8(4).
[412] Alberta Utilities Commission, "Coaldale Solar Project Acestes Venture Ltd." (31 May 2019) at para 29 online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/23821-D01-2019.pdf.
[413] *Ibid* at para 45.

expected the county to work with Acestes to ensure that their portion of the approval went through.[414]

In sum, the AUC can approve a project regardless of whether a municipality has approved it under their statutory plans or land use planning bylaws. This is important because under the *MGA*, in the event that there is a discrepancy between the municipal planning document and the AUC approval, the AUC decision prevails.[415] Specifically, if an application to amend a statutory plan is brought to a municipality and the application is consistent with a licence, permit, approval, or other authorization by the AUC, the municipality must approve the application.[416] If a municipality does not approve an application to make these amendments, the *MGA* sets out an appeal process for the proponent.[417]

There is one approved utility scale solar farm located within Edmonton's municipal boundary. The EPCOR E.L. Smith Water Treatment Plant solar energy project was approved by the AUC in 2019 and then went on to receive municipal approval for rezoning in 2020.[418] Specifically, before municipal approval was finalized, EPCOR had to reduce the project's footprint and designate space along the riverbank for wildlife.[419] There is debate about whether this project should have been approved at all due to its potential impact on wildlife and the more overarching question of whether we should allow development in the Edmonton river valley. Going forward, it will be important to consider siting and the minimization of environmental impacts when choosing the location for large-scale solar projects.

These types of land use conflicts add cost and conflict to the development of solar regimes. This is a direct reflection of a failure to integrate planning around land use and multiple environmental, social, recreational and economic outcomes.

Integrating renewable energy into planning decisions has been subject of recent work from Jiaao Guo et al., who have developed tools to assist in identifying the "most suitable lands" for renewable developments.[420] Similarly, the Miistakis Institute has published a decision support tool, *Least Conflict Lands: Municipal Decision Support Tool for Siting Renewable Energy*

[414] *Ibid* at para 49.
[415] *Municipal Government Act*, *supra* note 196, ss 619 & 620.
[416] *Ibid*, s 619(2).
[417] *Ibid*, ss 619(5) & (6).
[418] E.L. Smith Solar Power Plant EPCOR Water Services Inc., *supra* note 112 at para 27; CBC News, "Edmonton council approves rezoning for river valley solar farm" (19 October 2020) *CBC News* online: https://www.cbc.ca/news/canada/edmonton/river-valley-solar-farm-1.5768921.
[419] CBC News, "Edmonton council approves rezoning for river valley solar farm" (19 October 2020) *CBC News* online: https://www.cbc.ca/news/canada/edmonton/river-valley-solar-farm-1.5768921.
[420] Jiaao Guo, Victoria Fast, Philip Teri and Kirby Calvert "Integrating Land-Use and Renewable Energy Planning Decisions: A technical Mapping Guide for Local Government" *International Journal of Geo-Information* (May 2020) 9(5):324.

Development.[421] Planning for solar energy will mitigate conflicts with municipal plans and will create clarity for future solar developers. While utility scale solar developments have precedent in Alberta over municipal regulation, a more consistent plan this will increase efficiencies and mitigate conflict.

Additionally, smart land use should be encouraged. One way to do this is through multi-use spaces. Two of the innovative ways proposed for solar energy on greenfield properties are agrivoltaics and pollinator-friendly solar.[422] These strategies may not be useful for all parcels but do serve to demonstrate some of the considerations that should be made when choosing where to install utility-scale solar.

Recommendation

A provincial path to net zero should include a delineation of future solar scenarios. Planning for these scenarios should include a role for municipalities, regulators (AUC/AESO), distributors, and generators (including from a range of producers). Ideally, this would mitigate potentially conflicting climate, other environmental outcomes (such as those related to species at risk) and planning outcomes.

Access to Sunlight: Municipal Planning, Solar Easements, and Restrictive Covenants

While access to sun has yet to become a significant area of conflict in Alberta, it is anticipated that it will become more of an issue, particularly in urban environments where goals for densification and increased solar energy systems often exist simultaneously. Existing uncertainty around access to sun may also affect investor confidence making it less likely that solar energy systems will be installed on multi-family buildings and commercial buildings. Therefore, access to solar issues go hand in hand with development and planning.

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[421] Tracy Lee, Kelly Learned and Ken Sanderson (Calgary, Miistakis Institute, 2018), online: https://www.rockies.ca/files/reports/MIR_LCL_Report_FINAL.pdf.

[422] Elnaz H. Adeh et al., *Solar PV Power Potential is Greatest Over Croplands* (7 August 2019) 9 Scientific Reports online: https://www.nature.com/articles/s41598-019-47803-3; Katie Siegner et al., "Maximizing Land Use Benefits from Utility-Scale Solar: A Cost-Benefit Analysis of Pollinator-Friendly Solar in Minnesota" (December 2019) *Yale Center for Business and the Environment* at 2 online: https://cbey.yale.edu/sites/default/files/2019-12/MaximizingLandUseBenefitsFromUtility-ScaleSolar_0.pdf; Ilana Cohen, "Pollinator-Friendly Solar Could be a Win-Win for Climate and Landowners, but Greenwashing is a Worry" (28 November 2020) *Inside Climate News* online: https://insideclimatenews.org/news/28112020/pollinator-friendly-solar-greenwashing-risk/.

Law Reform for Solar Easements

An easement is a common law tool that gives the holder certain rights regarding property use. Property owners continue to own the land while giving up certain defined rights on the portion of land used for the easement.[423] Easements can be either express, in writing or registered on a land title, or implied, through a piece of legislation or use (such as a prescriptive easement that is prohibited by the *Law of Property Act*, as set out above).

Currently, and without a specific solar access law, if an express solar easement is agreed to between neighbours it can be upheld so long as it is clear and explicitly worded.[424] In order for an easement to be considered legally binding, it requires a concise definition and a clear description of the boundaries as they shift throughout the day. Further, any easement should specifically set out the terms and conditions for a termination or breach.[425] A strong definition may also include a description of the real property, the three-dimensional space, when the easement applies, any provisions for compensation, and a map of the property, among other details.[426] It should also specify how to create and terminate an easement including that both actions should be in writing and should be registered with the appropriate land titles office.[427]

In the United States, three types of solar easements have emerged in law. A consideration of all three may help create a streamlined approach to solar easements in Alberta.[428]

1. Time Protection Easement: an easement that seeks to prevent shading of the sunlight on a solar energy system during certain hours of the day. When creating such an easement it is necessary to first determine the length of time during each day when protection from shade is required to ensure the solar energy system is operational.[429]

2. Setback and Height-Restriction Easement: an easement designed to prohibit a neighbour from erecting any building or allowing vegetation to grow to a certain height that would block a solar energy system's access to sunlight.

3. Plane of Protection Easement: an easement that refers to areas designated as a plane in relation to the location of a solar energy system or to a boundary line.

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[423] Marie-Ann Bowden, *supra* note 231 at 276.
[424] Ronald M. Khrulak, *supra* note 238 at 11.
[425] *Ibid* at 11.
[426] *Ibid* at 11.
[427] *Ibid* at 11.
[428] Kamaal R. Zaida, *supra* note 220 at 117.
[429] This type of easement may be particularly relevant for Alberta due to the difference in daily hours of sun in Southern Alberta versus Northern Alberta.

Easements are negotiated on an individual basis and the remedy for a breach is litigation. The holder of an easement would typically seek either damages or an injunction in relation to the breach of the easement terms.

An injunction is a remedy which stops the defendant from engaging in an action that interferes with the rights of others.[430] A successful injunction requires that the applicant meet a three-part test, as set out in the Supreme Court of Canada decision *RJR MacDonald v Canada*.[431] This test requires that the applicant show:

- a serious issue to be tried;
- irreparable harm if the injunction is not granted; and
- that greater harm or inconvenience will result if the application is not granted, than would result if it were.[432]

The nature of this test means that injunctions will not be liberally granted by the courts, although with a clearly worded easement and straightforward evidence of the defendant breaching the easement, an injunction is clearly possible. The other option would be an award of damages which are court directed payments intended to compensate the plaintiff.

One way to make solar easements more accessible to property owners is to codify a solar easement into law. In Alberta, this could be added to the *Law of Property Act*.[433] First the existing *Law of Property Act* provision that eliminates a prescriptive right to light would need to be repealed and from there a solar easement could be legally defined.[434] Similar to existing legislation in California and Wisconsin, this provision could define a solar energy easement to ensure that "each parcel has the right to receive sunlight across adjacent parcels or units in the subdivision" like it does in California.[435] It could also set out the procedure to be followed if a solar easement is infringed upon, as is the case in Wisconsin where it states that the owner of a solar energy system is entitled to receive damages, court costs, and reasonable attorney fees from any person who causes an obstruction of their solar energy system.[436] A statutory definition provides clarity and confidence for those interested in pursuing a solar easement.

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[430] S.W. Chambers & Sean D. Parker, "A User's Guide to Injunctions & Related Remedies in Alberta" (22 February 2012) *Legal Education Society of Alberta* at 2 online: https://www.lesaonline.org/samples/61827_03_p1.pdf [S.W. Chambers & Sean D. Parker].
[431] *RJR MacDonald Inc. v Canada (Attorney General)*, [1994] 1 SCR 311.
[432] *Ibid*; S.W. Chambers & Sean D. Parker, *supra* note 430 at 2.
[433] *Law of Property Act*, *supra* note 224.
[434] *Ibid,* s 69(3).
[435] *Ibid*; California § 66475.3 *supra* note 315.
[436] Wisconsin Statute § 700.41, s 3.

Recommendation

Repeal the *Law of Property Act* section that eliminated the ancient lights doctrine, thereby reviving the option for property rights in solar access and replace the law with an amended legislative framework to enable solar easements.

Solar Restrictive Covenants in New Neighbourhoods

A restrictive covenant is a requirement or restriction over a piece of land that is registered on title and that comes with certain common law requirements. In order to be considered valid, a restrictive covenant must be expressly created but once implemented, it provides long-term protection that runs with the property. This means that the first owner, and every transferee, or any other person deriving title, is deemed to be affected with notice of the restrictive covenant and to be bound by it, unless properly terminated.[437]

Generally, restrictive covenants may be used in three situations:[438]

1. between adjoining landowners;
2. when a landowner conveys a portion of their property; or
3. as part of a general development scheme by a land developer.

The best option for solar projects is option number three. If a developer was to include a restrictive covenant protecting solar access in a community, it would ensure that solar access is available to the community rather than relying on a piecemeal approach. To do this, a residential developer may include a provision in the deed that a purchaser and all future owners shall not block sunlight from the rooftop of another.[439] A further benefit of a multi-party restrictive covenant is that removal requires a discharge by all those who benefit from the building scheme (i.e., all current owners of the dominant tenements).[440]

Like an easement, restrictive covenants should be clearly defined to ensure effectiveness and to conform to certain technical requirements which will ensure that they are properly registered as a property right that runs with the land.[441]

[437] Julie Krivitsky, *supra* note 221 at 15.
[438] Ronald M. Khrulak, *supra* note 238 at 8.
[439] Kamaal R. Zaida, *supra* note 220 at 119.
[440] Alberta Land Titles & Surveys, "Restrictive Covenants" Procedure Manual (1 January 2021) at 3 online: http://www.servicealberta.ca/pdf/ltmanual/RES-1.pdf.
[441] Ronald M. Khrulak, *supra* note 238 at 9.

Restrictive covenants can also only be enforced through court action. This occurs in part because municipalities do not keep restrictive covenants on file and are not required to comply with any existing restrictive covenants when drafting zoning bylaws or when approving new developments. However, restrictive covenants protect solar on a much larger scale than individual easements and have been found to be sufficient evidence for an injunction. This means that if an injunction is sought to enforce a clear breach of a restrictive covenant, the applicant will no longer need to prove the three-part test – described in the section on easements above.[442] The ability to receive an injunction would help to protect solar access, however, it does not eliminate the other downfalls associated with litigation, including cost and delays.

Recommendation

The development of new neighbourhoods should consider the implementation of a restrictive covenant requiring new buildings are built with solar access in mind.

Solar Readiness and Building Codes

For many years the creation of building codes has been undertaken nationally and implemented provincially (to help with a harmonized approach to the various code issues). At the federal level, the National Research Council (NRC) of Canada develops and updates Canadian building codes and standards.[443] Once developed, the NRC publishes five model codes; the two that could be used to affect or encourage solar development are the National Building Code of Canada and the National Energy Code for Buildings. The National Building Code provides direction for design and construction of new builds or substantial renovations and the National Energy Code for Buildings provides minimum energy efficiency requirements.

To be enforceable the codes must be adopted by the provincial government either fully or with amendments.[444] Although the federal design attempts to draft codes that will be compatible with provincial concerns, adoption of the national codes is voluntary.[445]

[442] S.W. Chambers & Sean D. Parker, *supra* note 430 at 3.
[443] National Research Council Canada, "Canada's national model codes development system" (16 June 2020) *Government of Canada* online: https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-development-process/canadas-national-model-codes-development-system.
[444] *Ibid*.
[445] *Ibid*.

The National Research Council has announced new federal codes, including both the National Building Code and the National Energy Code for Buildings, but they have been delayed until December 2021.[446] As such, the most recent amendments to the federal version are from 2015 and at the provincial level, a 2019 Alberta version adopted most but not all of the national code.[447] Currently, neither of these codes include solar energy specific standards (although some solar thermal systems are dealt with). Alberta buildings must also abide by provincial building codes under the *Safety Codes Act*.[448]

There are three main issues that would need to be addressed if building codes are going to encourage further solar energy development.

First is that building codes should consider solar readiness in their design. Including solar specific criteria in building codes will help prepare new builds for solar energy system installation, for example through properly designed fire safety systems, roof loads, and other aspects of new builds.[449] Once solar energy systems are incorporated into the building code, the next step could be a requirement for solar readiness in new builds across the country. The proposed federal codes are not yet available to the public so we will have to wait and see how they incorporate solar.

On the other hand, the *Photovoltaic Ready Guidelines*, (the "PV Guidelines"), published by Natural Resources Canada in 2018 are one step towards better solar readiness and include information for developers and builders.[450] These PV Guidelines set out design considerations and modifications for the installation of solar energy systems. Considerations include requirements for the building roof, PV conduits, installation requirements, and more.[451] More specifically the PV Guidelines set out recommended plans and layouts for installation including ideas for different types of roofs and other design considerations.[452] The PV Guidelines demonstrate ways for builders and developers to more efficiently incorporate solar readiness into their work and pave the way for future solar requirements, for example through changes to building codes.

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[446] Kevin Lockhart, "Canada's national model building codes delayed until December 2021" (1 September 2020) *Efficiency Canada* online: https://www.efficiencycanada.org/canadas-national-model-building-codes-delayed-until-december-2021/ [Kevin Lockhart].
[447] National Research Council of Canada, "National Building Code – 2019 Alberta Edition, NBC(AE)" (29 May 2019) *Government of Canada* online: https://nrc.canada.ca/en/certifications-evaluations-standards/codes-canada/codes-canada-publications/national-building-code-2019-alberta-edition-nbcae.
[448] *Safety Codes Act*, RSA 2000, c S-1.
[449] C3 – Energy. Ideas. Change., *supra* note 410 at 16.
[450] CanmetENERGY, "Photovoltaic Ready Guidelines" (2018) Version 1.0 *Natural Resources Canada* online: https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/canmetenergy/files/pubs/17-259_Photovoltaic-EN_accessible.pdf.
[451] *Ibid* at 1-4.
[452] *Ibid* at 5-9.

The second step entails assuring that provinces adopt the federal codes. Efficiency Canada highlighted some advocacy options to do this including increasing the number of energy advisors, building officials, trades and professions that are familiar with the building codes in their jurisdiction; establishing a network of building performance advocates; encouraging all levels of government from the municipal level up to push for high standards of energy efficiency and renewable energy use in building codes; supporting training for organizations; and more.[453] If the 2021 building codes include a focus on solar energy, they should be adopted by Alberta.

Third, enforcement needs to be considered. This will need to be done at the provincial level and the government should ensure adequate funding for training, awareness, and education to ensure that the codes, once adopted, are complied with.

Recommendation

Reform building and energy codes to ensure buildings are built solar ready and to allow for evolution of storage options and approaches.

Individual Financial Impediments

Small scale adoption of solar energy systems relies on the ability of interested parties to pay significant upfront capital. More flexible options for financing should encourage greater uptake from those who could otherwise not afford this investment.

This flexibility can be provided through several approaches. We will focus on two of them, reforming municipal property assessed clean energy legislation in Alberta and increasing supports for community and cooperative generation.

Financing Clean Energy under the MGA

In Alberta, the Clean Energy Improvement Tax was implemented by amendments to the *Municipal Government Act*.[454] It is important to note that the "tax" in this regard, is not a tax at all, rather it is a mechanism of financing energy improvements (with interest) and recovering those funds with the existing statutory priority of property taxes. In this regard the approach

[453] Kevin Lockhart, *supra* note 446.

[454] Bill 10: *An Act to Enable Clean Energy Improvements*, 4th Sess, 29th Leg, Alberta, 2018 [assented to 11 June 2018].

taken is quite onerous in its requirements it puts in place for municipalities. While some municipalities have initiated work on these programs there would be value in simplifying the legislative requirements related to these programs. In this regard, the province of Nova Scotia has taken a simplified approach to their legislation, enabling municipalities to deal with a suite of items through its bylaws.

Simplification would enable those municipalities to augment their bylaws as they see fit and grant new municipalities more flexibility in relation to financing.

Recommendation

Amend the MGA to simplify and increase flexibility in the Alberta property assessed clean energy financing system.

Promoting Community and Cooperative Energy Systems

Community Solar

At its most simple, a community solar project is a shared renewables program which allows "multiple customers to share the economic benefits from one renewable energy system via their individual utility bills."[455] In a community solar arrangement, individual members of the community have the opportunity to 'buy in' to a nearby solar installation and in doing so, receive a proportional share of the financial and/or energy output of the system.[456] In Alberta, we also have a second type of community solar, one which is defined under the *Small Scale Generation Regulation*.[457] The purpose of this Regulation is to fill the gap between micro generation (projects sized under 5MW) and utility-scale projects. More details are outlined in Part 2 above.

[455] Interstate Renewable Energy Council, "Model Rules for Shared Renewable Energy Programs" (2013) at 1-2 online: http://www.irecusa.org/wp-content/uploads/2013/06/IREC-Model-Rules-for-Shared-Renewable-Energy-Programs-2013.pdf [Interstate Renewable Energy Council, "Model Rules for Shared Renewable Energy Programs"].
[456] Herman K. Trabish, "Why utilities across the nation are embracing community solar: The shared renewables movement is catching on from coast to coast" (22 January 2015) *Utility Dive* online: https://www.utilitydive.com/news/why-utilities-across-the-nation-are-embracing-community-solar/354164/ [Herman K. Trabish].
[457] *Small Scale Generation Regulation*, *supra* note 160.

A community group may choose to apply as a community generating unit under the Small Scale Generation Regulation, however, it is not necessary to receive many of the benefits of a non-legislated community solar project such as cost and space saving.

On a larger scale, community solar can offer many benefits. For example, a major drawback of solar installation is the high upfront cost of a new system. A community-based approach would distribute the costs among many people, thereby lowering the cost for each. Community solar may be able to lower these costs further by leveraging peer effects and communication channels in an existing community network.[458]

An in-depth discussion of these benefits can be found in the Pembina Institute's *Alberta Community Solar Guide: Organizing and owning community solar PV projects*.[459] This report identified that community solar projects, like large scale projects, enjoy more of an economy of scale, receive investor-backed financing, benefit from renewable energy portfolio opportunities, and can use standardized equipment.[460] In addition, community solar can take advantage of some of the benefits generally associated with small scale solar such as low connection and transmission costs, high visibility, and the high alternative price for electricity.[461]

A community solar program should be accessible; expand renewable energy access to a broader group of consumers, including those who could not otherwise install it on their own property due to cost or living situation; afford participants tangible economic benefits on their utility bills; be flexible; and should be implemented alongside other programs.[462] Accessible solar energy is critical to a renewable energy transition and a program, like community solar, that works to expand solar access is a necessary tool.

Cooperatives

According to the Alberta Community & Co-operative Association, a cooperative ("co-op") is "a business owned and run by its members; who use and benefit from its goods or services."[463]

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[458] Richard J Wallsgrove, "Is Community Solar Really a Security" Vermont Law Review, Volume 43, Number 4 (Summer 2019) at 777.
[459] Kabir Nadkarni & Sara Hastings-Simon, "Alberta Community Solar Guide: Organizing and owning community solar PV projects" (November 2017) at 5 online: https://www.pembina.org/reports/alberta-community-solar-guide.pdf [Kabir Nadkarni & Sara Hastings-Simon].
[460] *Ibid* at 5.
[461] *Ibid* at 5.
[462] Interstate Renewable Energy Council, "Model Rules for Shared Renewable Energy Programs" *supra* note 455 at 3 & Herman K. Trabish, *supra* note 456 for other benefits.
[463] Alberta Community & Co-Operative Association, "What is a co-operative?" online: https://www.acca.coop/about-coops.

Generally, co-ops are for profit organizations that must abide by certain standards set out in the *Cooperatives Act.*[464] This Act sets out requirements for a co-op such as that: [465]

- memberships must be available to people who can use the services of the co-op and who are willing and able to accept the responsibilities;
- members must get one vote and cannot vote by proxy; and
- interest is limited on member loans.

Most co-ops in Alberta are governed by this Act and the accompanying *Cooperatives Regulation*[466] with the exception of rural utility cooperatives, which are governed by the *Rural Utilities Act*.[467]

Although membership in a co-op may lead to some economic success, co-ops are designed to advance the welfare of their members through more general benefits including lower priced goods or lower production costs or through access to a new business in their community. This differs from a traditional investment vehicle which is primarily, or even exclusively, designed to provide a gain on one's capital investment.[468]

Cooperative Types

Many of the traditional co-op structures such as grocery stores or credit unions may not seem relevant to our goal of increased solar energy usage in Alberta but, in fact, there is more than one type of co-op that can be used to encourage solar energy production in the province. Specifically, we can look to two: opportunity development co-ops and utility co-ops.

Opportunity Development Cooperatives

An opportunity development co-op is a for-profit investment vehicle that acts similarly to a private investment corporation while focusing on one community and the investments that will

[464] *Cooperatives Act,* RSA 2001, c C-28.1 [*Cooperatives Act*].
[465] *Ibid*, s 3.
[466] *Cooperatives Regulation,* Alta Reg 55/2002 [*Cooperatives Regulation*].
[467] *Rural Utilities Act,* RSA 2000, c R-21 [*Rural Utilities Act*].
[468] Daniel Ish, "Management and Membership in Canadian Co-Operatives" (1975) 13:3 Alta L Rev 412 at 417 at 412.

benefit that community.[469] It is formed by community members and is registered with the provincial government as a for-profit entity.[470]

Once an opportunity development co-op has been established, the co-op can work with project proponents to develop and advance business opportunities that are in need of an investment. Investment may be in the form of debt financing such as through loans; or equity financing including land, equipment, or co-ownership.[471] It is beneficial to members because it affords them the opportunity to influence development in their community, invest in something that they will personally have a chance to use, and earn money.[472]

Requirements for opportunity development co-ops including membership, bylaws, and naming rules are set out in the *Cooperatives Act*[473] and *Cooperatives Regulation*.[474] The Government of Alberta also provides information for parties interested in setting up this type of co-op including forms for creating articles of incorporation,[475] bylaw requirements,[476] and more.[477]

Opportunity development co-ops allow for investments in many forms including through RRSP and TFSA eligible shares.[478] This flexibility allows them to be applicable to more individuals and to generate more wealth for community projects.

Though these vehicles are not yet as common in the renewable energy sector as they are in others, opportunity development co-ops for solar specific projects have already started to influence development. For example, the Solar Power Investment Co-op of Edmonton is working with solar project proponents and all levels of government to create an Edmonton based investment scheme for solar projects in the area.[479]

In Ontario, the co-op SolarShare began investing in solar projects in the province in 2010. SolarShare offers investments for solar energy projects across the province, requiring a $1,000 minimum investment and is available for all Ontario residents. Projects funded by this co-op range in size from 10 kW rural systems to 600 kW industrial systems.[480] To read more check out their website.

[469] Alberta Community & Co-Operative Association, "Community Energy: Co-operative Toolkit" (March 2017) at 20 online: https://nadc.ca/media/17627/community-energy-co-op-toolkit.pdf [Community Energy: Co-operative Toolkit].
[470] *Ibid* at 43.
[471] *Ibid* at 43.
[480] SolarShare, "Solar Projects" online: https://www.solarbonds.ca/all-projects/all-projects.

Utility cooperatives

Utility co-ops are governed by the *Rural Utilities Act* and are defined specifically as co-ops that have, as their principal objective, the job of supplying utilities to rural areas.[481] They are similar in many ways including that they are governed by bylaws,[482] require members,[483] have an elected Board of Directors,[484] and hold yearly AGMs.[485] A number of these utility co-ops exist in Alberta. For example, we have 37 Rural Electrification Associations, 170 water co-ops, and 82 gas co-ops.[486]

Solar Co-ops vs. Community Solar?

While co-ops and community solar are similar and often overlapping, on a legal basis, one is not required for the other. Community solar can refer to any project that powers more than one property – for example, a solar energy system installed on a large condo building or the Drake Landing Solar Community - a solar energy system that powers 52 homes.[487] This form of community solar is "an ownership model for solar PV systems that enables more community members to have a partial stake in owning, leasing, or accessing electricity from a nearby solar PV array."[488] Community solar, like large scale solar, can take advantage of investor-backed financing – including through co-ops.

Additionally, although a solar co-op could invest in a community solar project generally or in a community generating unit as defined under the *Small Scale Generation Regulation,* this is not

[473] *Cooperatives Act*, *supra* note 464.
[474] *Cooperatives Regulation, supra* note 466.
[475] Service Alberta, "Summary of Articles of Incorporation – Cooperatives Act ss 4, 5 & 269(3)" online: https://coopcreator.ca/wp-content/uploads/2019/01/Alberta-articles.pdf.
[476] Service Alberta, "Bylaw Requirements Reference Guide – Cooperatives Act" (April 2002) online: https://open.alberta.ca/dataset/8062f5e1-7de6-40df-a54b-44f1cdab76a7/resource/6cc1bb40-f00f-483a-ae40-48a9e72b39c9/download/bylaw_requirements.pdf.
[477] Service Alberta, "Incorporate an Alberta Cooperative" online: https://www.alberta.ca/incorporate-an-alberta-cooperative.aspx.
[478] Community Energy: Co-operative Toolkit, *supra* note 469 at 20.
[479] Solar Power Investment Co-op of Edmonton, "Purpose & Values" online: https://joinspice.ca/about/.
[480] SolarShare, "Solar Projects" online: https://www.solarbonds.ca/all-projects/all-projects.
[481] *Rural Utilities Act*, *supra* note 467, s 3(1).
[482] *Ibid*, s 9.
[483] *Ibid*, s 10.
[484] *Ibid*, s 13.
[485] *Ibid*, s 12.
[486] Alberta Community & Co-Operative Association, "Types of Co-operatives" online: https://www.acca.coop/co-op-types.
[487] Drake Landing Solar Community, "Welcome to Drake Landing Solar Community" online: https://www.dlsc.ca/.
[488] Kabir Nadkarni & Sara Hastings-Simon, *supra* note 459 at 3.

required. A solar co-op could also invest in many single property solar projects such as a project that provides solar energy for a single industrial site or utility scale solar that provides solar energy for a larger area.

However, overlap can exist because both a co-op and rural utility association could qualify as a community group under the *Small Scale Generation Regulation*.[489]

A co-op may help to finance or pay for projects that may not have otherwise gone ahead, work to keep money and production in the community, and give community members more control over the development in their area, among other things. Solar co-ops offer some of the same benefits as community solar such as allowing individuals who would otherwise lack access to a solar energy system the chance to invest in a portion or share of a solar project and therefore receive some corresponding benefits – whether that is economic or is measured by an increase of renewable energy powering the electrical grid.

Virtual Net Metering

The AESO defines virtual net metering as a "process whereby the records (i.e., consumption, generation, or both) from multiple interval meters are combined to produce single records as if there were one "virtual" meter"[490] Put more simply, virtual net metering allows customers to 'virtually' connect to a separate solar energy system. This can be beneficial for those individuals who are unable to install their own solar energy system. For example, a renter could choose to buy into a virtual net metering program and the proportional amount of energy generated would be used to reduce the measured consumption of their energy bill. Generally, virtual net metering is used to complement shared solar arrangements like community solar projects.

Customers can benefit from virtual net metering whether they live in a heritage home, a rental, a condo or are otherwise unable to afford their own solar energy system. In this way, virtual net metering is an option for both community solar programs and co-ops. In fact, in 2017, during AUC consultations regarding the regulation of distribution system-connected generation, solar energy companies and the Pembina Institute advocated for virtual net metering as a way to encourage community solar.[491] In this scenario, community solar members could invest in a large scale solar energy system and receive a credit on their energy bill even if none of that solar energy went directly to their home or business. Power distribution companies did not

[489] *Ibid*, s 1(e).
[490] Alberta Utilities Commission, "Alberta Electric Distribution System-Connected Generation Inquiry" (29 December 2017) at para 233 online: https://www.auc.ab.ca/Shared%20Documents/DistributionGenerationReport.pdf [Alberta Electric Distribution System-Connected Generation Inquiry].
[491] *Ibid* at para 238.

support virtual net metering, arguing that it would be costly and complex and the policy was not implemented.[492] They were concerned with the effect that virtual net metering would have on their profit margins and pushed back against any plans to implement such a program.

Despite this opposition, virtual net metering would be beneficial for a number of reasons including:[493]

- accessibility;
- more focused site selection to ensure that areas with the highest solar potential are being exploited;
- lower individual cost;
- allowing customers to stay with their current utility; and
- supporting the overall adoption of green energy.

More generally, virtual net metering would provide another option for individuals to connect to large or community scale solar.

Implementing virtual net metering would likely require a shift in how customers are reimbursed for their electricity generation. Currently, most distributed generation including microgeneration and small scale generation uses net billing rather than net metering. Net billing is set out in the *Micro-Generation Regulation* and is defined as "subtracting electric energy supplied out of a micro-generator's micro-generation site during the billing period from electric energy supplied into the micro-generator's micro-generation site or aggregated sites during the billing period, and calculating a net charge or credit to the micro-generator based on the resulting net usage of electric energy during the billing period."[494] Net metering, on the other hand, acts as a direct rollback, allowing a customer to reduce the meter's measurement of the customer's consumption by the amount of generation supplied to the distribution system.[495] Net metering typically results in higher refunds going back to those customers that are generating energy.

Recommendation

Develop policy supports to address barriers to successful community and coop programs. This may include grants specific to small scale generators, policy clarity, and government

[492] *Ibid* at para 237 - 238.
[493] Ontario Solar Installers, "What Is Virtual Net Metering?" online: https://ontario-solar-installers.ca/solar-panel-installers/what-is-virtual-net-metering/.
[494] *Micro-Generation Regulation*, *supra* note 148, s 1(j).
[495] Alberta Electric Distribution System-Connected Generation Inquiry, *supra* note 490 at para 223.

support for implementing community benefit agreements to ensure they can be administered efficiently. Further, the *Micro-Generation Regulation* should be amended to allow virtual net metering.

Financial Tools to Facilitate Solar Growth

Financial incentives or subsidies are used across sectors to minimize investment risk, encourage research and development, and foster entrepreneurship. Although, utility scale solar investments in Alberta are increasing even with minimal financial incentives, these greenfield sited systems are lower cost relative to the cost of engaging broad uptake of solar PV systems on existing infrastructure. Further, even with these investments, solar still makes up a small proportion of our energy landscape. If we want to deal with the climate crisis, changes will need to happen quickly and that will require a shift in where our money goes.

This section will highlight some of the financial tools that can be used to incentivize solar technology and development. One of the conclusions that can be drawn from this overview is that while different policies come with different benefits or drawbacks, credibility (no retroactive changes) is a key design feature to ensure success and uptake.[496]

[496] Friedemann Polzin et al., *supra* note 15 at 1259.

Feed-in Tariffs

A feed-in tariff ("FIT") is a program which guarantees that the owners of renewable energy installations receive a set, above-market price per kWh for the power they feed onto the grid.[497] The purpose of a FIT is to encourage development of the type of energy resources that qualify for the tariff – generally renewable resources. The certainty of a fixed price reduces risk because developers can be assured that they will be paid, enabling more investment.[498] FITs are one of the most widely implemented renewable energy policy instruments and they are often associated with an increase in renewable energy deployment and investment as they guarantee a stable return.[499]

In Canada, we have had limited examples of FITs, including a program out of Ontario which has now been shuttered. On November 30, 2009, the Ontario Power Authority established "North America's first comprehensive guaranteed pricing structure for renewable energy production."[500] This FIT was unique as it allowed projects to qualify up to three years before beginning production so long as security was paid.[501] The program limited eligible solar PV projects to 10 MW in size and priced them from $0.44 to $0.80 c/kW, with smaller projects on the higher end of the price range.[502] Notably, the FIT program was embedded within the *Green Energy Act* of 2009, which has since been repealed.

At its most basic form, a FIT is a payment to the renewable energy generator for each kWh of electricity they produce. Successful FIT policies are designed to allow for an adequate recovery of project costs plus a reasonable rate of return, thereby increasing investor security.[503] A successful FIT program will likely have a number of elements including: [504]

- access to the grid and certainty that the electricity produced will be purchased. This may require a 'priority purchase obligation' or renewable energy portfolio to ensure that renewable energy is purchased before a fossil fuel option;
- no administrative cap, allowing projects to be scaled up to meet industry and economic needs;

[497] The Pembina Institute, "Feeding the Grid Renewably: How feed-in tariffs maximize the benefits of renewable energy" online: https://www.pembina.org/reports/feed-in-tariffs-factsheet.pdf.
[498] Michael Dorsi, "Clean Energy Pricing and Federalism: Legal Obstacles and Options for Feed-in Tariffs" (2012) 35:2 Environs 173 at 178 – 179 [Michael Dorsi].
[499] Friedemann Polzin et al., *supra* note 15 at 1255.
[500] David Grinlinton & LeRoy Paddock, *supra* note 326 at 959.
[501] *Ibid* at 959.
[502] *Ibid* at 959.
[503] *Ibid* at 948.
[504] Michael Dorsi, *supra* note 498 at 186 & 187; Friedemann Polzin et al., *supra* note 15 at 1256.

- no project size limitations;
- longer-term contracts. Long term contracts reduce risk whereas variability in duration increase risk;
- details relevant to multiple types of solar technology such as thermal energy and concentrated solar power. Differentiation based on technology type is important;
- tariff prices that cover all costs as well as provide a reasonable profit;
- prices that take into account technology type, size, ownership, location, and other distinguishing factors; and
- regulatory certainty to ensure that the program will continue as described.

FITs have been known to even out the playing field in a fossil fuel dominated electricity grid but issues still arise. Ensuring that the FIT program is efficient is crucial to minimize some of these issues but, as is the case with many renewable energy tools, FITs do not work well in a vacuum. For example, implementing a FIT does nothing to address the high up-front costs of a renewable energy system. Over time, a larger market and increased competition will see a corresponding drop in price, as was the case in Germany, but work should be done to implement other financial incentives in the short term. [505] Additionally, FITs are complicated and require extensive administrative and policy work, particularly if Alberta were to take the lead as one of the first provinces to implement a FIT.

In Alberta, the cost of a FIT will also need to take into account the cheap and easy access to oil and natural gas which will affect the price required to ensure competitiveness. Another potential issue arises when the cost of the FIT is passed on to consumers. It is important that the price is managed so as to ensure that it does not become prohibitive. [506]

The Town of Banff implemented Alberta's first feed-in tariff program back in 2015, at the time called a "solar PV production incentive." The program was funded by their municipal franchise fee which had been set aside for environmental purposes since 2010. In order to be eligible, project proponents must be Banff residents and have an approved micro-generator with the incentive amount based on productivity. Read more from the Town of Banff here and from the Pembina Institute here.

[505] David Grinlinton & LeRoy Paddock, *supra* note 326 at 947 – 948.
[506] Michael Dorsi, *supra* note 498 at 181 – 182.

Renewable Energy Portfolio Standard

A renewable energy portfolio standard ("RPS") is a quantity-based policy that obligates utility companies to generate a specified share of their electricity from renewable energy.[507] An RPS guarantees that a certain amount of renewable energy will be sent to the electrical grid. These programs are often associated with the deployment of larger and more cost-effective projects by companies using mature, well established technologies.[508] The section on Germany above outlines the details of their successful RPS program.

RPS programs can be customized in a number of ways including through an adjustment of the duration of the program, changes to capacity and sales requirements, favouring less mature technologies, or through the introduction of penalties.[509] One defining feature is contract duration which plays a role in the effectiveness of an RPS program and signals policy stability.[510]

Power Purchase Agreements

Power purchase agreements ("PPA") are long-term contracts pursuant to which a customer buys electricity from a generator.[511] PPAs can be negotiated on an individual basis or through an auction. In Alberta, the Renewable Electricity Program ("REP") relied upon these auctions. This was a program designed to meet the provincial government's goal of 30% renewable electricity by 2030.[512] The program initiated three competitive auction programs leading to 1,360 MW of renewable electricity capacity.[513] Under the REP program, the government guaranteed a price for companies, which meant that if electricity prices fell below the contracted price, the government would supplement the difference but if the prices received were above the contracted price, the project proponent would pay the difference.[514] In the first round, the auctions set a new Canadian record for the lowest renewable electricity price at $37/MWh.[515] Rounds 2 and 3 received similar prices, all for wind projects.[516] Since these projects went online, the Government of Alberta has continued to benefit. The value of the

[507] Friedemann Polzin et al., *supra* note 15 at 1253.
[508] *Ibid* at 1255-1256.
[509] *Ibid* at 1258.
[510] *Ibid* at 1258.
[511] Simon Baines *supra* note 13 at 391-392.
[512] *Renewable Electricity Act*, *supra* note 73, s 2(1).
[513] Alberta Electric System Operator, "REP Results" online: https://www.aeso.ca/market/renewable-electricity-program/rep-results/ [Alberta Electric System Operator, "REP Results"].
[514] Alberta Electric System Operator, "About the Program" online: https://www.aeso.ca/market/renewable-electricity-program/about-the-program/.
[515] Alberta Electric System Operator, "Round 1 Infographic" online: https://www.aeso.ca/assets/Uploads/REP-Infographic.pdf.
[516] Alberta Electric System Operator, "REP Results" *supra* note 513.

three wind facilities has been $54+/MWh versus a contract price of $37/MWh, which has resulted in a gain of $26 million to the government.[517]

A review of PPA auctions outside of Alberta found the success of these programs is dependent on design. For example, the duration of support, pre-bid planning, developer penalties, and contract standardisation are all factors that can impact the success of a PPA auction program.[518] One of the first determinants of an effective program is the duration, with longer duration reducing project and financing risks.[519] The pricing mechanism also matters, with uniform pricing and high competition leading to low bidding and low realization rates.[520] Another factor to consider is that technology neutral auctions seem to favour mature technologies.[521] The PPA REPs in Alberta may be an example of this as wind power projects, which are more common in Alberta than solar, were the more successful projects in each round. The bottom line is that transparent, predefined criteria along with consistency and credibility will reduce risks and increase successful uptake.[522]

Tax Incentives

Another type of financial incentive can come from tax credits. In the United States, the American Solar Investment Tax Credit began in 2006 and was so successful, it was renegotiated in 2015 for a further 6 years.[523] This tax credit provides a 30% credit for solar systems on residential and commercial properties and has helped annual solar installation in the United States grow exponentially.[524] After witnessing this success the Canadian Solar Industries Association (now known as the Canadian Renewable Energy Association), a solar advocacy group, expressed their support for tax credits for solar installation and have been advocating for similar tax programs in Canada.[525]

[517] Sara Hastings-Simon & Blake Shaffer, "Valuing Alberta's Renewable Electricity Program" (March 2021) *The School of Public Policy Energy & Environmental Policy Trends* online: https://www.policyschool.ca/wp-content/uploads/2021/03/EEP-trends-Shaffer.pdf.
[518] Friedemann Polzin et al., *supra* note 15 at 1255.
[519] *Ibid* at 1258.
[520] *Ibid* at 1258.
[521] *Ibid* at 1258.
[522] *Ibid* at 1258.
[523] Solar Energy Industries Association, "Solar Investment Tax Credit" *supra* note 286.
[524] *Ibid*.
[525] Canadian Solar Industries Association, "Roadmap 2020: Powering Canada's Future with Solar Electricity" at 10-11 online: https://www.cansia.ca/uploads/7/2/5/1/72513707/cansia_roadmap_2020_final.pdf.

Grants

Public investment is another way for governments to encourage deployment of renewable energy.[526] In Canada, the federal government's ecoENERGY program has incentivized and supported the development of solar energy programs.[527] The program has three branches including the Renewable Heat Initiative which focused on the use of renewable thermal energy; the Renewable Power Program which is designed to support renewable technologies including solar; and the Retrofit Homes Program which supports property owners to install energy efficient upgrades.[528] Although this program is coming to an end in 2021, other funding opportunities would help carry the financial burden of new solar energy systems.

Grants are most effective when deployed alongside a policy mix including other tools such as tax incentives, FITs, or RPSs but are an important tool to increase solar energy capacity.[529]

Recommendation

Implement a feed-in tariff and RPS to incentivize investment in solar energy generation. Tax incentives and grants can also be used to level the playing field between new solar energy projects and entrenched fossil fuel investment.

Practical Challenges of Solar Distribution and Storage

In Alberta, the Alberta Electric System Operator ("AESO") is in charge of managing the electricity grid. The AESO is also responsible for planning for the future grid, including any new renewable energy installations. In this regard, AESO releases a *Long-Term Transmission Plan* which sets out a blueprint for the next 20 years, the most recent of which was released in

[526] Friedemann Polzin et al., *supra* note 15 at 1255.
[527] Natural Resources Canada, "ecoENERGY for Renewable Power" (29 July 2020) Government of Canada online: https://www.nrcan.gc.ca/nrcan/ecoenergy-renewable-power/14145.
[528] Kamaal R. Zaida, *supra* note 220 at 125-128.
[529] Friedemann Polzin et al., *supra* note 15 at 1255.

2020.[530] A separate document was released specifically for renewable energy called the *Transmission Capability Assessment for Renewables Integration*.[531]

The *Long-Term Transmission Plan* focuses primarily on the 'Reference Case', a future grid plan based on current policies and the existing electricity framework. The Reference Case has limited space for future renewable energy with faster renewable energy development limited to the 'Alternate Renewables Policy'.[532] Under the Alternate Renewables Policy, the AESO considers ways to augment capability for renewable energy including:[533]

- converting the existing EATL HVDC[534] from today's mono-pole operation to bi-pole operation by adding additional converters and voltage support devices at the two terminals to double the existing transfer capability;
- adding 240 kV lines; and
- adding a 500 kV line.

According to the *Transmission Capability Assessment for Renewable Integration*, the integration capability of the existing transmission system is approximately 470 MW with 340 MW in the southwest and 130 MW in the southeast.[535] The AESO identifies a number of areas including in Edmonton and Calgary where new transmission and supply will be necessary, particularly in the event of higher renewable deployment.[536] While the AESO is contemplating a future electricity grid with increased renewable power, their reference case contemplates more natural gas development and less renewables. This may affect the grid's ability to cope in the event that we see a surge in renewables.

Most recently, the AESO announced that they are working on a 2021 Long-Term Outlook Scenario which has more space for renewable energy including 750 MW attributed to corporate

[530] Alberta Electric System Operator, "AESO 2020 Long-term Transmission Plan" (January 2020) online: https://www.aeso.ca/assets/downloads/AESO-2020-Long-termTransmissionPlan-Final.pdf [AESO 2020 Long-term Transmission Plan].
[531] Alberta Electric System Operator, "2019 Transmission Capability Assessment for Renewables Integration: Impacts of Renewables Electricity Program Rounds 2 and 3 and Selected System Projects" (March 2019) online: https://www.aeso.ca/assets/Uploads/2019-Transmission-Capability-Assessment-Final-18Apr2019.pdf [2019 Transmission Capability Assessment for Renewables Integration: Impacts of Renewables Electricity Program Rounds 2 and 3 and Selected System Projects].
[532] AESO 2020 Long-term Transmission Plan, *supra* note 530 at 3.
[533] *Ibid* at 63 - 64.
[534] Eastern Alberta Transmission Line High-Voltage Direct Current.
[535] 2019 Transmission Capability Assessment for Renewables Integration: Impacts of Renewables Electricity Program Rounds 2 and 3 and Selected System Projects, *supra* note 531 at 1.
[536] AESO 2020 Long-term Transmission Plan, *supra* note 530 at 67.

power purchase agreements.[537] While this is a positive step, this scenario may underplay the role of renewables. In contrast, the Business Renewables Centre Canada is targeting an increase of 2,000 MW of renewable energy by 2025.[538]

Current AESO scenarios are problematic in two ways. The first is that, if we are going to meet our Paris Agreement targets, the amount of renewable energy anticipated in these reports is not sufficient. The Canadian Energy Regulator notes that reaching a goal of net-zero by 2050 requires additional measures than those set out in even the most recent Canadian energy scenario.[539] The second is that if renewable energy uptake increases at a faster pace, these scenarios suggest that the Alberta grid will not be prepared. It is important to adjust both our planning documents and goals to reflect a future clean electricity grid. The following section will highlight why we should be preparing our grid for more renewable energy penetration.

Shifting Costs – Utility Scale to Individual Scale

New technology requires a shift in focus and while solar has myriad benefits, it also comes with certain challenges. This shift may occur in a scenario in which small scale solar becomes more common than utility scale generation. In this type of scenario, many individuals will receive compensation for the electricity they generate, lowering their personal electricity bills.[540] However, the costs of electricity infrastructure and distribution will not necessarily have changed at the same rate and utility companies are generally not willing to cut into their profits which may lead to costs being assigned to those not generating energy.[541]

Different jurisdictions have proposed different solutions to this issue including charging fees specific to utility customers that have their own solar energy systems.[542] This can be in the form of grid maintenance fees or exit fees and would be applicable to customers with net-metered, on-site distributed energy systems such as rooftop solar.[543] Another proposal is to reform utility rates to increase the fixed portion of customers' monthly bills in contrast to bills based on the

[537] Alberta Electric System Operator, PowerPoint Presentation "2021 Long-term Outlook Scenarios: Stakeholder Engagement & Feedback" (December 2020) at 8 online: https://www.aeso.ca/assets/Uploads/Scenarios-Overview-for-Stakeholder-Insights-08Dec2020.pdf.
[538] As cited by Benjamin Thibault, "Greening Government's Power in Alberta: Next Steps & New Lessons" (12 January 2021) online: https://www.linkedin.com/pulse/greening-governments-power-alberta-next-steps-new-lessons-thibault/.
[539] Canada's Energy Future 2020, *supra* note 36.
[540] Troy A. Rule, *supra* note 10 at 130.
[541] *Ibid* at 121 – 122.
[542] *Ibid* at 121 – 122.
[543] *Ibid* at 121 – 122.

quantity of electric power supplied to the customer.[544] These costs would be paid by all electricity customers.

Reliance on either of these options will likely lead to less solar installation due to increased costs. Research has found that reductions in the per-kWh price weakens customers' incentives to conserve electricity or to make buildings more energy efficient.[545] These types of decisions focus on the profit generated by utility companies and ignore the other benefits associated with switching to solar such as decreased pollution, a better chance of meeting our renewable energy targets, and more. Instead, we may want to focus on encouraging community and co-op structures to ensure that everyone can participate in the energy transition.

Solar Energy and the Duck Curve

Another technical issue associated with solar energy is the "duck curve." The duck curve refers to the potential for overgeneration of solar energy during the middle of the day.[546] The potential for overgeneration occurs because during the time when most solar energy is generated, individual households are not using this energy – they are at work, school, or otherwise out of the house. In contrast, at the time of day when most people are using electricity – primarily the early morning or the evening – solar energy generation is at its lowest.

Having generation misaligned with demand raises a variety of technical challenges many of which can be improved by technical fixes including improved systems to allow for quick starts; improved transmission and coordination between areas; reserves; and energy storage.[547] Some of these challenges will be addressed by technological innovations. For example, battery storage technology is ever improving. If we can store solar energy when it is generated, to be used when it is needed, it will be more useful for more consumers.[548]

Another challenge, however, comes from a lack of predictability.[549] With more solar energy systems installed, more work will be required to properly balance load supply and demand on

[544] *Ibid* at 123.
[545] *Ibid* at 123.
[546] Becca Jones-Albertus, "Confronting the Duck Curve: How to Address Over-Generating of Solar Energy" (12 October 2017) Office of Energy Efficiency & Renewable Energy online: https://www.energy.gov/eere/articles/confronting-duck-curve-how-address-over-generation-solar-energy.
[547] National Renewable Energy Laboratory, "Emerging Issues and Challenges in Integrating High Levels of Solar into the Electrical Generation and Transmission System" (May 2016) U.S. Department of Energy at 21-30 online: https://www.nrel.gov/docs/fy16osti/65800.pdf.
[548] *Ibid* at s 4.3.
[549] Troy A. Rule, *supra* note 10 at 120.

the grid. This will require a flexible approach allowing easy ramping up and down of centralized power plants while also predicting and responding to changes in the amount of power being supplied by rooftop solar energy systems. This balancing act often requires estimating how productive all of these customer-controlled systems will be at any given time.[550]

One way Alberta is attempting to manage these challenges is through the AESO's newly announced Operator's Fast Frequency Response Technology Pilot Project ("FFR"). FFR is "a fast-acting transmission reliability service."[551] AESO announced the pilot project in October 2020 with implementation set for 2021.[552] It will be an open procurement process with the goal of acquiring 20-40 MW of capability.[553] The end goal of this project is to prevent outages for electricity consumers. In order to do this, the AESO requires that providers enable a response within 12 cycles (equivalent to 0.2 seconds) when a system frequency of 59.5 Hz is detected.[554] Solar PV may be one type of technology that can provide FFR through the use of batteries or fast responding control systems.[555] Technology like this is still new and is limited in Alberta but may be a way to manage some of these technical issues.

Recommendation

Ensure that future grid planning considers the need for renewable expansion as a means to meet our climate goals. This should be done in conjunction with municipal and land-use planning.

Energy Storage

One of the challenges that comes with relying on solar energy is the intermittent nature of the sun. This is where energy storage comes in. The AESO defines energy storage as "any technology or process that is capable of using electricity as an input, storing the energy for a

[550] *Ibid* at 120.
[551] Alberta Electric System Operator, "Joint Stakeholder Engagement Session on Energy Storage and Distributed Energy Resources" PowerPoint Presentation (14 October 2020) at 30 online: https://www.aeso.ca/assets/Uploads/Oct4.-14-Joint-ES-and-DER-Stakeholder-Engagement-Session-Presentation-.pdf.
[552] *Ibid* at 32.
[553] *Ibid* at 31.
[554] *Ibid* at 31.
[555] See Samuel C. Johnson, Joshua D. Rhodes, Michael Webber, "Understanding the impact of non-synchronous wind and solar generation on grid ability and identifying mitigation pathways" (2020) *Applied Energy* 262, online: ScienceDirect https://www.sciencedirect.com/science/article/pii/S0306261920300040; Jessica Kennedy et al., "Alberta Electric System Operator Announces New Energy Storage Procurement Opportunity" (22 October 2020) Osler online: https://www.osler.com/en/resources/regulations/2020/alberta-electric-system-operator-announces-new-energy-storage-procurement-opportunity?viewmode=0&utm_source=update&utm_campaign=alberta_electric_system_operator_announces_new_energy_storage_procurement_o.

period of time and then discharging electricity as an output."[556] However, Alberta has a limited regulatory system in place to manage and approve storage facilities. The AUC noted this in two recent decisions in which they had to consider battery storage as part of the application.

During the approval process for the Empress Solar Power Plant, the AUC noted that there are "no existing market rules or regulation governing the operation of battery storage systems."[557] The AUC managed this by undergoing a limited evaluation of the battery storage component of the project including consideration of how it may be treated under the *Electric Utilities Act*[558] and the *Hydro and Electric Energy Act.*[559] They found no clear inconsistency between the purposes of the Act and the battery storage part of the project, thereby approving that portion of the project as well.[560] The AUC also considered economic, social, and environmental effects, noting that despite control systems to prevent adverse effects, without clear standards each approval will be based on the information available at the time.[561] For example, the AUC stated that they "expect that the control systems and fire suppression systems within the battery storage units would limit the risk of a potential fire or reaction" but we are left with limited objective evaluation of these risks.[562] A final requirement was that the project proponent ensure that the battery supplier had a recycling program for those batteries that are in need of replacement – highlighting that there are no reclamation requirements for battery storage facilities.[563] In a second decision the AUC relied on the purpose section of the *Hydro and Electric Energy Act* to conclude that the battery storage component of the proposed project was acceptable.[564]

The AUC approved another energy storage project in January 2021, this time a FortisAlberta energy storage project located in Waterton National Park.[565] This project was proposed as a backup electricity option to step up primarily during summer electricity outages.[566] In their application, FortisAlberta notes that one of the reasons they opted for the energy storage option was because it was less expensive than a wires alternative.[567] This suggests that as

[556] Alberta Electric System Operator, "AESO Energy Storage Roadmap" (August 2019) at 6 online: https://www.aeso.ca/assets/Uploads/Energy-Storage-Roadmap-Report.pdf [AESO Energy Storage Roadmap].
[557] Aura Power Renewables Ltd. Empress Solar Power Plant, *supra* note 124 at para 41.
[558] *Electric Utilities Act*, SA 2003, c E-5.1.
[559] *Hydro and Electric Energy Act*, *supra* note 79.
[560] Aura Power Renewables Ltd. Empress Solar Power Plant, *supra* note 124 at paras 41-45.
[561] *Ibid* at paras 41-45.
[562] *Ibid* at paras 41-45.
[563] *Ibid* at para 45.
[564] Aura Power Renewables Ltd. Fox Coulee Solar Project, *supra* note 87; Aura Power Renewables Ltd. Empress Solar Power Plant, *supra* note 124 at paras 306 – 309.
[565] Alberta Utilities Commission, "FortisAlberta Inc. Waterton Battery Energy Storage System" (15 January 2021) online: https://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2021/26101-D01-2021.pdf.
[566] *Ibid* at para 7.
[567] *Ibid* at para 8.

energy storage options decrease in price, they will become more common. A notable section of the decision discusses unregulated energy storage facilities connecting to the electricity grid. In their statement of intent to participate, the AESO acknowledged that they prefer energy storage facilities be owned by unregulated entities who can compete in the market as opposed to regulated entities (in this case an electricity distribution utility) who should not be allowed to participate in the unregulated market.[568] Despite this concern, the AUC approved the project noting that any effect on the electricity market from this single small-scale energy storage project will be negligible.[569] However, approvals may not be so accessible should more energy storage projects of this type be proposed.

The AESO has acknowledged these gaps stating that the "current parameters and ISO rules do not fully contemplate energy storage, and, as a result, moving these projects through the AESO's Connection Process is difficult."[570]

Alberta's first utility-scale lithium-ion battery storage facility went online on October 15, 2020 at the TransAlta Summerview Wind Farm. This is not a solar project but battery storage for renewables anywhere in Alberta is a major step for renewables everywhere. TransAlta relied on funding from Emissions Reduction Alberta to fund this project. Check out their website for more.

While changes to Rule 007, including an energy storage application form, are an improvement, more is needed to ensure that battery storage projects are properly approved, connected to the grid, and later reclaimed taking into consideration environmental impacts and energy objectives. The AESO has developed the *Energy Storage Roadmap* to close this existing gap and to help integrate energy storage solutions into our electricity market.[571] One challenge is that the AESO tariff structure, which dictates the costs that storage assets must pay before being able to connect to the grid, does not consider the unique attributes of storage facilities (as a hybrid of generation and load source).[572] The AESO is currently undergoing consultation and

[568] *Ibid* at para 12.
[569] *Ibid* at 13.
[570] AESO Energy Storage Roadmap, *supra* note 556 at 3.
[571] AESO Energy Storage Roadmap, *supra* note 556; Jessica Kennedy et al., "Alberta Electric System Operator Announces New Energy Storage Procurement Opportunity" (26 October 2020) *Mondaq* online: https://www.mondaq.com/canada/oil-gas-electricity/997864/alberta-electric-system-operator-announces-new-energy-storage-procurement-opportunity?email_access=on.
[572] *Ibid*.

planning for a change in the tariff system including issues specific to battery storage such as a:[573]

- separate rate class for energy storage;
- demand transmission service rate specific to energy storage;
- different rate structure for energy storage assets used for system services; and
- change to the generation unit owner's contribution to energy storage under legislation and regulation.

Recommendation

Along with updates to AUC Rule 007, AESO should ensure to follow through on promises to update the tariff system with considerations specific to battery storage and consider the ownership of energy storage facilities by both regulated and unregulated entities.

[573] AESO Energy Storage Roadmap, *supra* note 556 at 16.

Alberta's Future can be Bright

A changing climate demands that we change, adapt, and mitigate our greenhouse gas emissions. In Alberta, we are at a crossroads as the world weans itself off of oil. We were a frontrunner in the non-renewable energy sector, facilitated by policy, regulatory, and financial supports. We can and should do the same for a renewable energy future in Alberta. We have both the resources and the knowledge base, and with some regulatory structure and incentives it is likely that solar energy can play a significant role in Alberta's energy mix.

This requires minimizing potential conflicts around land uses, raising standards for our building stock, and minimizing financial risks where necessary. It also means promoting policies and regulations that foster distributed generation among communities and coops and assisting individual property owners to broaden solar PV uptake in the built environment. Already the cost of solar has decreased substantially and with some support Alberta's future can be bright.