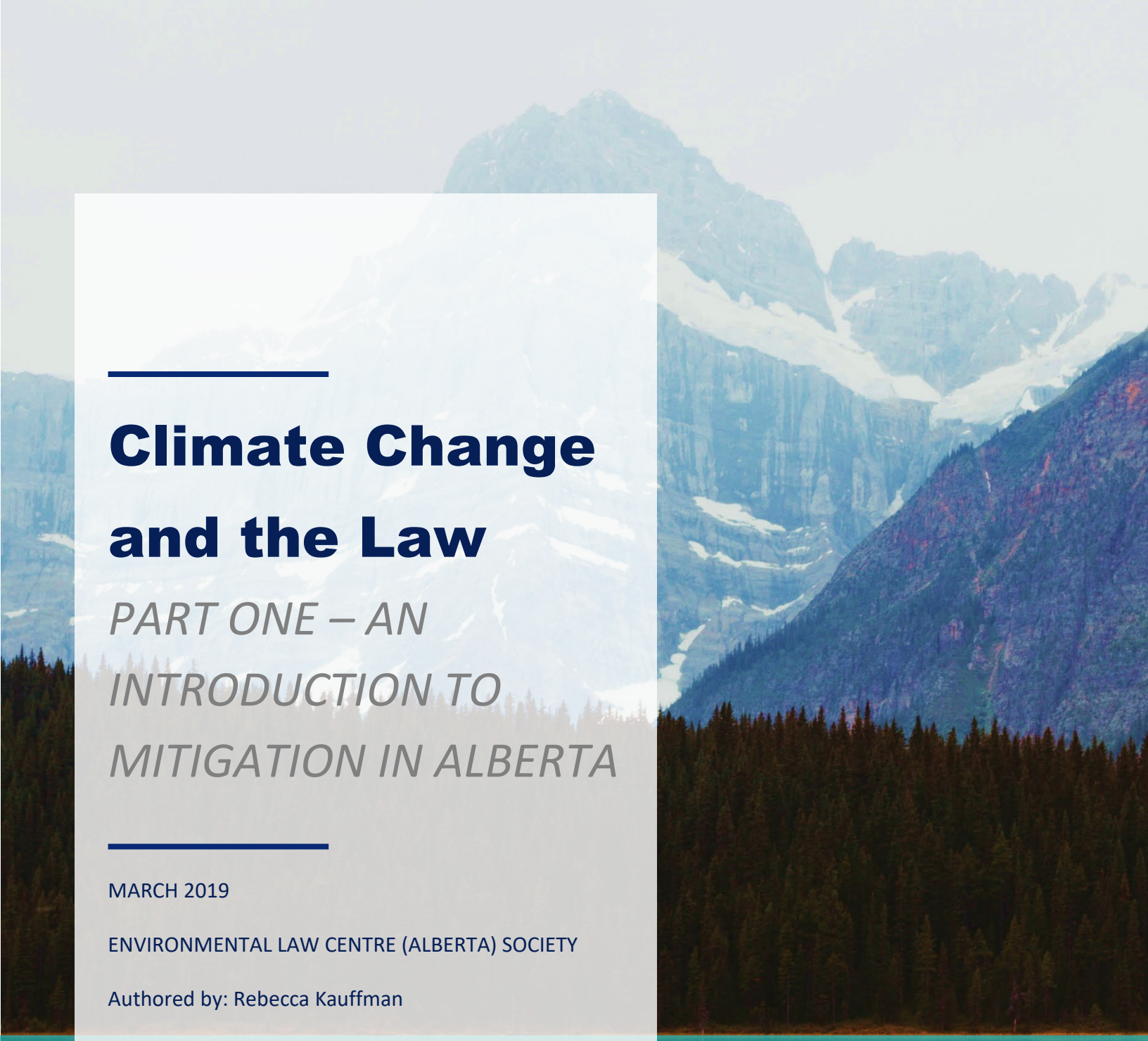

Climate Change and the Law

PART ONE – AN INTRODUCTION TO MITIGATION IN ALBERTA

MARCH 2019

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 educate and champion for strong laws and rights so all Albertans can enjoy clean water, clean air and a healthy environment. Our vision is a society where laws secure an environment that sustains current and future generations.

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Executive Summary

The Environmental Law Centre (ELC) recognizes that climate mitigation and adaptation measures should be a priority for every Albertan. Despite the full implications of climate change remaining uncertain, there is a recognized need to act locally, provincially, nationally and internationally in order to mitigate harm to people and the planet arising from these climate change impacts.

This report is the first of a series by the ELC on climate mitigation and adaptation in Alberta. This two-part volume will provide a primer for those with a general interest in the various touch points of law and climate mitigation and adaption and will provide a foundational launching point for future ELC projects on renewable energy, adaptation, and energy efficiency. What this primer is not, is a detailed analysis of all the legal issues that arise around climate mitigation and adaptation. The first volume of this primer will focus on the mitigation of climate change including how we can conserve energy and how we can begin the transition from fossil fuels to renewable energy. The second volume will then provide an overview of how the province and its industries are responding to those climate change impacts that have already begun.

The International Panel on Climate Change (IPCC) summarizes the interrelationship between mitigation and adaptation as: [1]

> "Adaptation is necessary in the short and longer term to address impacts resulting from the warming that would occur even for the lowest stabilisation scenarios assessed. There are barriers, limits and costs, but these are not fully understood. Unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt. The time at which such limits could be reached will vary between sectors and regions. Early mitigation actions would avoid further locking in carbon intensive infrastructure and reduce climate change and associated adaptation needs."

Specific to this first volume, the IPCC also has an important definition to be aware of. The international body defines mitigation as "an anthropogenic intervention to reduce the sources or enhance the sinks

[1] RK Pachauri & A Reisinger eds, Climate Change 2007: Synthesis Report – Contribution of Working Groups I, II and III to the Fourth Assessment, Report of the Intergovernmental Panel on Climate Change, IPCC, 2008 at 19.

of greenhouse gases" with the ultimate goal of mitigation being to address and lessen the negative effects of climate change."[2]

To begin, this primer will take a closer look at energy conservation and efficiency, expanding upon why we need to focus on energy efficiency if we want to mitigate the effects of climate change, and evaluating the ways by which we are starting to improve.

In conjunction with a focus on energy efficiency, the IPCC has also found that, "[a]ccess to clean and reliable energy constitutes an important prerequisite for fundamental determinants of human development, contributing, inter alia, to economic activity, income generation, poverty alleviation, health, education and gender equality."[3] In addition to these benefits, renewable energy use will significantly lower GHG emissions, contributing to our international climate agreements. Considering this, the second part of this primer will focus on renewable energy and the transition to clean energy across Alberta – where we are at and where we still need to go.

[2] The success of mitigation efforts is quantified through the measurement of yearly carbon dioxide and other GHG emissions, into the atmosphere and successful mitigation efforts are recognized by a decrease in GHG emissions, which are often set at a benchmark number. These measurements help to determine whether GHG emissions are in decline and whether the effects of climate change, caused by these same emissions, are being mitigated. (United States Environmental Protection Agency, "Understanding Global Warming Potentials" (14 February 2017) Government of the United States online: https://www.epa.gov/ghgemissions/understanding-global-warming-potentials) The danger related to these gases is not their existence, as they do occur naturally, but rather, the rapid increase of the quantity present in the atmosphere. This increase in GHGs is directly contributing to a rising global average temperature. In order to slow down this temperature increase, GHGs need to be limited and eventually removed. (David Suzuki Foundation, "Greenhouse gases" (5 October 2017) online: https://davidsuzuki.org/what-you-can-do/greenhouse-gases/).

[3] Ottmar Edenhofer et al, *Summary for Policymakers in: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation* (Cambridge: University Press 2011) at 41 online: http://www.ipcc.ch/pdf/special-reports/srren/Summary%20for%20Policymakers.pdf [Ottmar Edenhofer].

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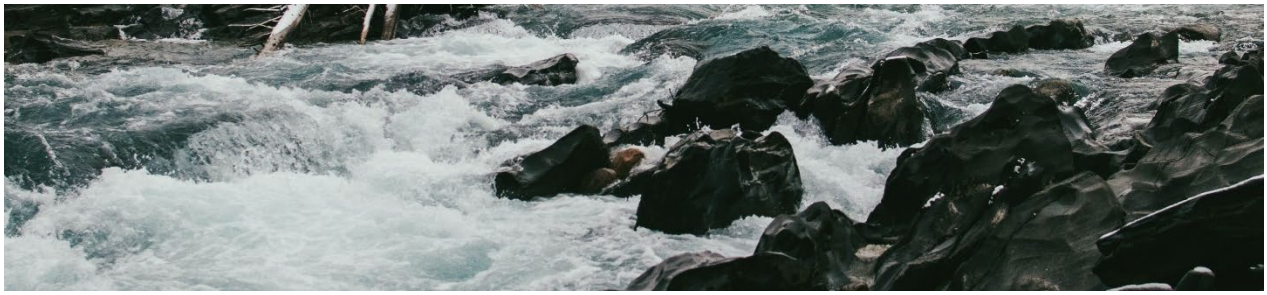

CLIMATE CHANGE AND THE LAW

PART ONE – INTRODUCTION TO MITIGATION IN ALBERTA

INTRODUCTION TO MITIGATION

The central aim of the Paris Agreement is to strengthen the global response to climate change by limiting the rise in global temperature to below two-degrees Celsius above pre-industrial levels. This anticipated rise in temperature, along with any accompanying side effects, can be reduced, delayed or avoided through mitigation.

The objective of stabilizing greenhouse gases (GHGs) for the purpose of mitigation has been accepted by the global community, including Canada, with the ratification of the *United Nations Framework Convention on Climate Change* – and subsequent associated agreements.[4] This acceptance was clarified most recently, with the ratification of the Paris Agreement in 2015. The central aim of the Paris

[4] *United Nations Framework Convention on Climate Change,* 9 May 1992, 1771 UNTS 107, art 1, 31 ILM 849 (entered into force 21 March 1994); Jenette Poschwatta, "Alberta's 2008 Approach to Climate Change: A Step Forward?" (April 2008) Canadian Institute of Resources Law Occasional Paper #24 at 9 online: https://dspace.ucalgary.ca/bitstream/1880/47019/1/ClimateOP24.pdf [Jenette Poschwatta].

Agreement is to strengthen the global response to climate change by limiting the rise in global temperature to below two-degrees Celsius above pre-industrial levels. This anticipated rise in temperature, along with any accompanying side effects, can be reduced, delayed or avoided through mitigation.

In fact, although current international agreements focus on a two-degree Celsius limit, numerous island nations, and international environmental scientists, are pushing for an even stricter 1.5-degree Celsius limit. Recent studies which found that the difference between two-degrees Celsius, and the 1.5-degrees Celsius is significant also support this stricter limit.[5] In particular, in 2018 the IPCC released a highly anticipated in-depth look at the differences between a 1.5-degree and two-degree threshold.[6] Their overall conclusion was that many of the catastrophic changes originally expected to occur at two-degrees Celsius were actually more likely at only 1.5-degrees and therefore, found that limiting global warming to 1.5-degrees above pre-industrial levels is necessary to reduce negative climate impacts and their associated costs.[7] Despite recognition that limiting the current warming trend to 1.5-degrees will be difficult, particularly due to a lukewarm political climate, the IPCC is optimistic that with strong climate policy we will be able to limit global warming. The IPCC is even more confident that this action is necessary if we want to prevent catastrophic impacts.[8] These efforts will require even more stringent mitigation efforts.

In the legal realm, climate change mitigation efforts are affected by both legislative change and regulatory decisions that seek to lessen the harmful effects of climate change through limits on GHG emissions. Although there are numerous ways to mitigate the effects of climate change, for example

[5] Carl-Friedrich Schleussner et al, Differential climate impacts for policy-relevant limits to global warming: the case of 1.5° C and 2° C (21 April 2016) 7 Earth System Dynamics 327.

[6] Myles Allen et al, "Global Warming of 1.5° C an IPCC special report on the impacts of global warming of 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty: Summary for Policymakers" (6 October 2018) Intergovernmental Panel on Climate Change online: http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf [Myles Allen].

[7] Intergovernmental Panel on Climate Change, "Global Warming of 1.5° C an IPCC special report on the impacts of global warming at 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty" online: http://www.ipcc.ch/report/sr15/; Myles Allen.

[8] Intergovernmental Panel on Climate Change, Press Release "Summary for Policymakers of IPCC Special Report on Global Warming of 1.5° C approved by governments" (8 October 2018) online: http://www.ipcc.ch/pdf/session48/pr_181008_P48_spm_en.pdf.

through the protection of forests or through changes to the foods we eat, this primer will focus on energy conservation and renewable energy; because where we get our energy from, and how we use it, has a direct impact on the potential climate change effects of our other activities.

This should not be viewed as diminishing the importance of other GHG mitigation strategies, such as carbon capture, either through natural or unnatural sinks.

Renewable energy's decentralized nature is one example of the numerous external forces that could swing the balance from fossil fuels to renewable energy, forces that extend far beyond an initial start-up cost analysis and that are important when considering the overall value of renewable energy versus non-renewable energy. The benefits of renewable energy resources may include opportunities that are not expressly outlined in this primer, such as social and economic development; energy access; energy security and climate change mitigation; and the reduction of environmental and health impacts. Broader indicators measured by the Human Development Index are also positively correlated with per capita energy use and can extend beyond economics and numbers.[9] Although these indicators are relevant, this primer is not an exhaustive list of the nuanced ways to assess the positive impacts of renewable energy.

[9] Amie Gaye, "Human Development Report 2007/2009: Fighting Climate Change Human Solidarity in a Divided World" (2007) Human Development Report Office: Occasional Paper UNDP at 1 online: http://hdr.undp.org/sites/default/files/gaye_amie.pdf.

ENERGY EFFICIENCY AND CONSERVATION IN ALBERTA

Saving a unit of energy can be five times cheaper than buying it and overall, energy efficiency is considered to be more cost effective than switching to renewables or buying fossil fuels.

Energy efficiency is key to successful mitigation and is recognized by the IPCC as a requirement for an effective mitigation strategy. To demonstrate this point, as far back as 2006 the IPCC reported that most industrial processes use at least 50% more energy than the theoretical minimum.[10] For example, in Alberta, in 2009, the average home consumed ~39,200 eKWh or 141 GJ (287 KWh/m^2 or 1.03 GJ/m^2) through energy use such as heating and cooling, appliances, and lighting.[11] In contrast, a high performance demonstration project in Regina found that they could achieve an annual energy demand of 30 ekWh/m^2 (or 0.1 GJ/m^2) through improved technology and construction methods.[12] These findings demonstrate that energy inefficiency is rampant and that even without any other changes, increased energy efficiency could significantly reduce GHG emissions.

Energy efficiency and conservation measures are of high value, as they align with both mitigation and adaptation strategies. Further, efficiency measures are often the low hanging fruit of climate mitigation efforts. There is even evidence to show that saving a unit of energy can be five times cheaper than

[10] B. Metz et al, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 (Cambridge University Press: Cambridge) at s 7.3.2.

[11] Natural Resources Canada, "Comprehensive Energy Use Database: Residential Sector – Alberta" Government of Canada online: http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/trends/comprehensive/trends_res_ab.cfm; Eugene Mohareb & Jesse Row, "Improving Energy Efficiency in Alberta's Buildings: Best Practices, Key Actors and the Role of Sustainable Energy Organizations" (January 2014) Pembina Institute at 8 online: https://www.pembina.org/reports/improving-energy-efficiency-in-alberta-buildings.pdf [Mohareb & Row].

[12] Mohareb & Row at 8.

buying it and overall, energy efficiency is considered to be more cost effective than switching to renewables or buying fossil fuels.[13]

Figure 1: Trends in Energy Use and Intensity by Subsector compiled by Natural Resources Canada

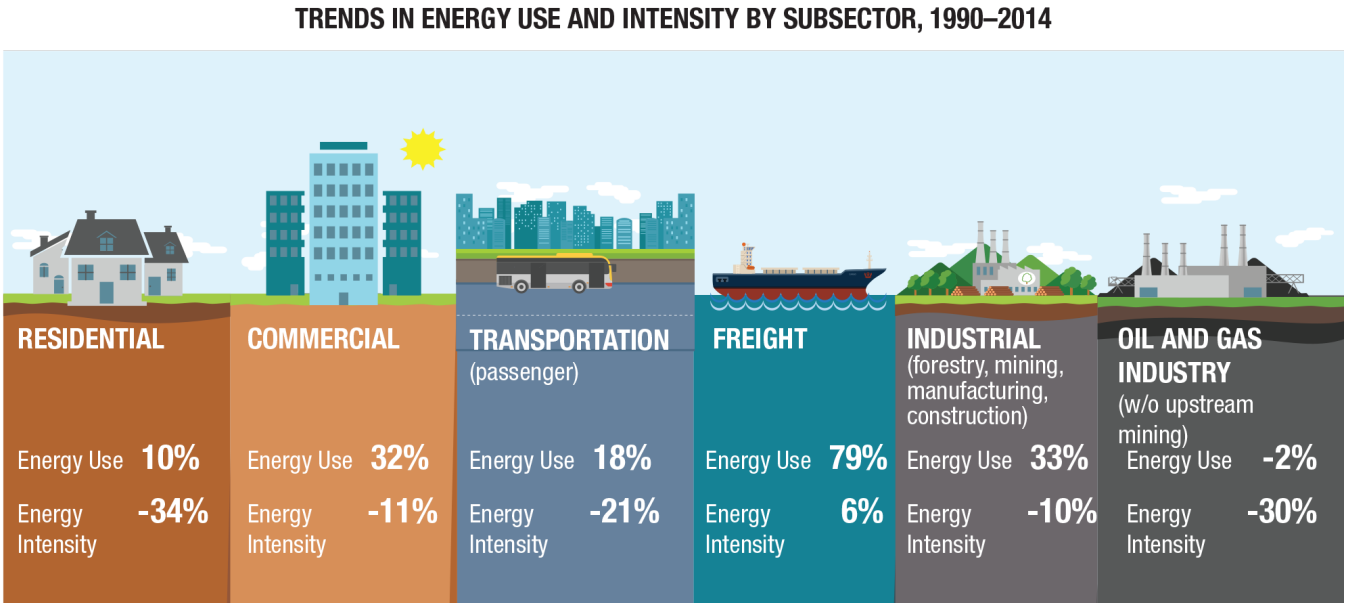

Image courtesy of Natural Resources Canada[14]

This energy loss comes from both a loss of energy directly out of the building infrastructure as well as through the use of inefficient appliances or other energy using products.

Building Codes

Buildings are some of the most significant emitters of fossil fuels in Canada, with residential and commercial buildings currently responsible for more than 40% of energy use across the country.[15]

[13] Grantham Institute – Climate Change and the Environment, "Energy Efficiency in Buildings Innovation Lab" (November 2017) Secretariat The Climate Group online: http://www.imperial.ac.uk/grantham/publications/energy-efficiency-innovation-lab.php.

[14] Natural Resources Canada, "Energy and Greenhouse Gas Emissions (GHGs)" (4 January 2018) Government of Canada online: https://www.nrcan.gc.ca/energy/facts/energy-ghgs/20063 [Natural Resources Canada, "Energy and Greenhouse Gas Emissions (GHGs)"].

[15] Natural Resources Canada, "Energy and Greenhouse Gas Emissions (GHGs)".

In an effort to begin to combat this substantial energy loss, in 2016 Alberta adopted new energy efficiency requirements for housing and small building construction, raising the energy efficiency standards for new builds. [16] These new requirements can be found under section 9.36 of the 2014 *Alberta Building Code*. Notably, however, these changes only apply to buildings which meet the qualifications for size and usage.[17] For buildings covered by the new changes, the requirements are quite substantial and include changes to the thermal characteristics of building assemblies, changes to above and below grade assemblies, new standards for windows, doors, and skylights, and increased quality of airtightness, HVAC, and water heating standards, among others.[18]

Policy changes have also occurred in Alberta with programs spearheaded by Energy Efficiency Alberta. A major provincial program was the Residential No-Charge Energy Savings Program. This program sent an installer to homes and condos to identify and install any potential opportunities for energy-efficient upgrades.[19] There are also home improvement rebates as well as energy efficiency upgrades available for non-profits, among other programs.

Outside of Alberta, the Federal Government is in the process of releasing *Major Energy Retrofit Guidelines*. These guidelines have been designed to improve the energy efficiency of existing buildings through retrofits. They are divided by building type, although not all have them have been released as of the date of publication.[20]

Non-governmental efforts are also underway. In 2017, the National High Performance Building Challenge, a new energy efficiency program led by BOMA Canada began. This program recognizes

[16] BILD Alberta, "ABC 9.36 Energy Efficiency for Small Buildings" online: http://www.bildalberta.ca/abc-9-36-energy-efficiency-for-small-buildings?mid=1228.

[17] BILD Alberta, "Demystifying 9.36" at 4 online: http://www.bildalberta.ca/uploads/files/PDF/Demystifying%20%209.36.pdf.

[18] RDH Building Science, "Illustrated Guide for the Alberta Building Code 9.36. Prescriptive Energy Efficiency Requirements for Houses" (November 2016) online: http://www.bildalberta.ca/uploads/files/PDF/2016%2011%2018%20CHBA%20-%20Alberta%209.36%20Illustrated%20Guide%20(1).pdf.

[19] Energy Efficiency Alberta, "Residential No-Charge Energy Savings Program" (2018) Government of Alberta online: https://www.efficiencyalberta.ca/residential-no-charge/.

[20] Natural Resources Canada, "Retrofitting" (9 May 2018) Government of Canada online: https://www.nrcan.gc.ca/energy/efficiency/buildings/20707.

leading building designs working towards net-zero energy use. Although not a regulation, increased focus and attention on energy efficiency pioneers may help to steer markets towards this same goal.[21]

Requirements for Appliances

Similar to buildings, appliances are responsible for significant energy use and waste – leading to increased and unnecessary GHG production. The *Energy Efficiency Regulations, 2016,*[22] enabled by the federal *Energy Efficiency Act*[23] sets out the standards for energy using products ranging from household appliances, to air conditioners, furnaces, and electronics.

The purpose of this Act is to regulate the type and quality of energy using products being sold, transported, and used in Canada.[24] It also provides enforcement mechanisms and sanctions, in the event that energy products being sold do not meet the required standard.[25] In turn, the Regulations provide specific standards which can be followed when importing, selling, or using energy use products.[26]

The PACE program (Property Assessed Clean Energy Legislation)

A property assessed clean energy (PACE) program enables loans which can be issued to citizens who are interested in making energy efficiency and clean energy upgrades to property. Enabled through the *Municipal Government Act*[27] these types of loans can be recovered as a municipal tax and are attached to the property.[28]

The PACE program allows individuals to install energy upgrades on their property without having to pay for expensive upgrades outright. The loans may be made by independent finance companies or a

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[21] Natural Resources Canada, "Net Zero Challenge" (6 March 2018) Government of Canada online: https://www.nrcan.gc.ca/energy/efficiency/buildings/eenb/18989.

[22] *Energy Efficiency Regulations, 2016*, SOR 2016-311 [*Energy Efficiency Regulations*].

[23] *Energy Efficiency Act*, SC 1992, c 36 [*Energy Efficiency Act*].

[24] *Energy Efficiency Act*, s 2.

[25] *Energy Efficiency Act*, s 27.

[26] *Energy Efficiency Regulations*.

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

[28] Bill 10.

municipality. In this way, the barrier created by the high upfront costs associated with upgrading to clean energy systems can be overcome.

The *Clean Energy Improvements Regulation* sets out some of the PACE program details.[29] These details include: how the program administrators are to establish which improvements are eligible for the program;[30] a list of qualified contractors that may be used to install these improvements;[31] requirements, fees, and the approval process for program applications;[32] and monitoring and reporting requirements. The Regulation also requires that municipalities who wish to participate in the PACE program pass a clean energy improvement tax bylaw ("PACE bylaw"). This PACE bylaw must indicate that a clean energy improvement tax may be imposed on a property that is subject to a clean energy improvement agreement at any time following the signing of the agreement and must identify the program administrator.[33]

Although the basic framework of the legislation and regulation has been passed, and came into force on January 1, 2019, the individual program details for each municipality have yet to be completed.[34]

CLIMATE MITIGATION AND RENEWABLE ENERGY PRODUCTION IN ALBERTA

Natural Resources Canada defines renewable energy as "energy obtained from natural resources that can be naturally replenished or renewed within a human lifespan, that is, the resource is a sustainable source of energy."[35] This primer will focus on five types of renewable energy: solar, wind, geothermal, bioenergy, and hydroelectricity.

[29] *Clean Energy Improvements Regulation*, Alta Reg 212/2018 [Clean Energy Improvements Regulation].

[30] *Clean Energy Improvements Regulation*, s 3.

[31] *Clean Energy Improvements Regulation*, s 4.

[32] *Clean Energy Improvements Regulation*, ss 7, 8 & 9.

[33] *Clean Energy Improvements Regulation*, s 5.

[34] Government of Alberta, "Property Assessed Clean Energy (PACE) legislation" online: https://www.alberta.ca/PACE.aspx.

[35] Natural Resources Canada, "About Renewable Energy" (29 June 2016) Government of Canada online: http://www.nrcan.gc.ca/energy/renewable-electricity/7295#what.

The relative effectiveness of each renewable system in mitigating GHG emissions will differ between type but also between the circumstances in which it is deployed. Figure 2 below illustrates the differences in lifecycle emissions among power sources.

Figure 2: IPCC rendering of the GHG emissions released during the lifecycle of both renewable and non-renewable energy sources.

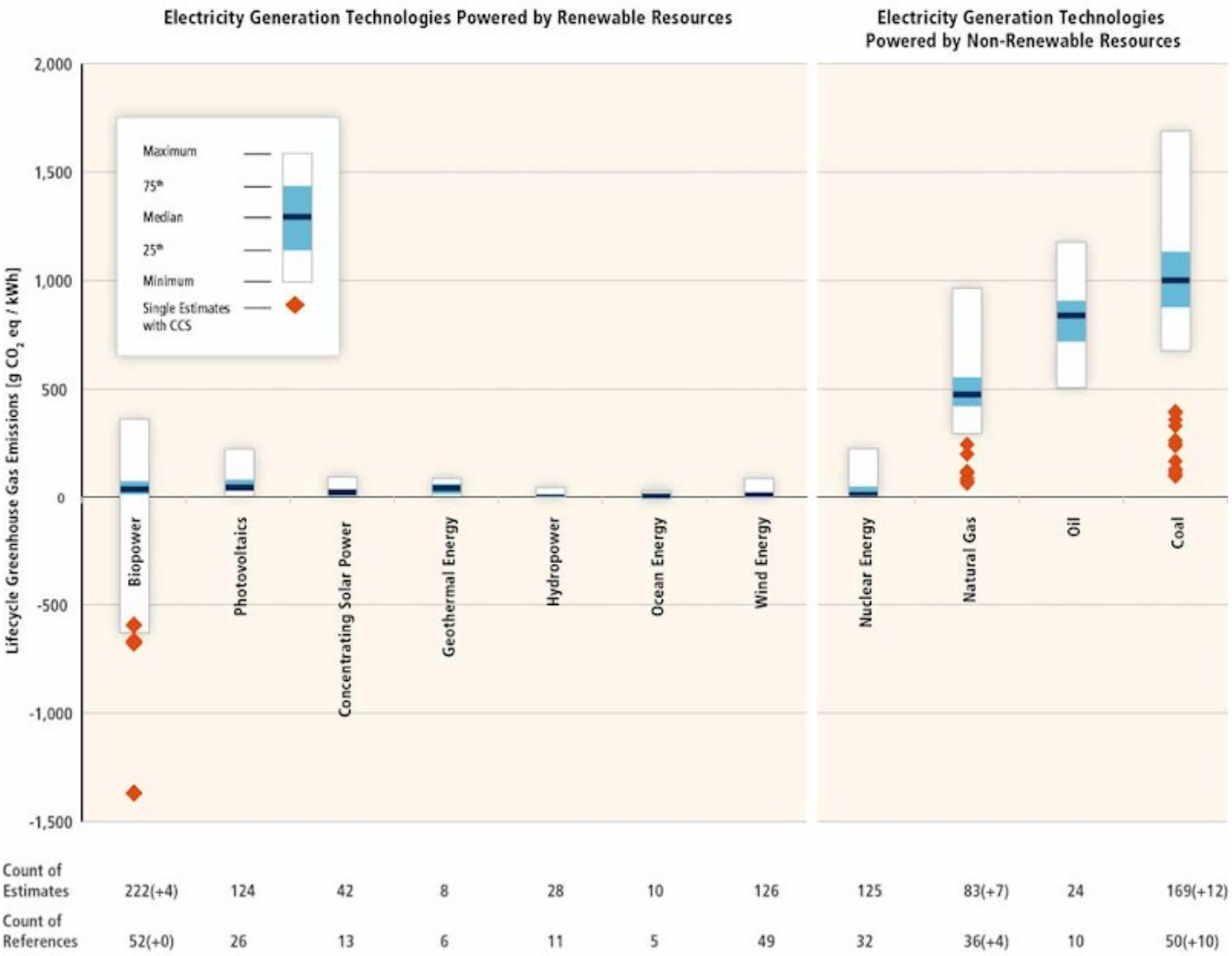

Image courtesy of the Intergovernmental Panel on Climate Change[36]

[36] Ottmar Edenhofer.

PROVINCIAL LEGISLATION GOVERNING RENEWABLE POWER GENERATION

Renewable energy resources are "energy resources that occur naturally and that can be replenished or renewed within a human lifespan, including moving water, wind, heat from the earth, sunlight, and sustainable biomass."

The *Renewable Electricity Act* focuses on the promotion of renewable energy generation in the province.[37] The *Renewable Electricity Act* defines renewable energy resources as, "an energy resource that occurs naturally and that can be replenished or renewed 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."[38] The Act sets a target for 30% of all produced electrical energy coming from renewable sources by 2030.[39]

THE REGULATORY FRAMEWORK FOR RENEWABLE ENERGY IN ALBERTA

The following section summarizes the regulatory framework currently in place for renewable energy projects in Alberta. To begin, Table 1 below sets out, at a glance, when certain laws or regulations may be triggered by renewable energy projects, subject to individual circumstances.

[37] Brenda Heelan Powell, "Alberta's Climate Leadership Plan: An Update on Law and Policy Developments" (5 July 2017) *LawNow* online: http://www.lawnow.org/albertas-climate-leadership-plan-an-update-on-law-and-policy-developments/ [Brenda Heelan Powell].

[38] *Renewable Electricity Act*, SA 2016, c R-16.5 s 1(l) [*Renewable Electricity Act*].

[39] *Renewable Electricity Act*, s 2(1).

Table 1: Legislative Triggers at a Glance (multiple exceptions apply).

	Small Scale Solar	Large Scale Solar	Small Scale Wind	Large Scale Wind	Geothermal	Hydroelectricity	Bioenergy
Provincial Law							
EPEA Approval/ Authorization							
Mandated Environmental Assessment (*EPEA*)							
Water Act (Licences and approvals)							
Alberta Utilities Commission Approvals/Regulations							
Alberta Energy Regulator							
Federal Law							
Fisheries Act							
Migratory Birds Convention Act, 1994			** #	** #			
Species at Risk Act							
Navigation Protection Act							
Canadian Environmental Assessment Act, 2012							
Municipal Law							
Municipal Approvals		*		*	*	*	*

LEGEND

Very Likely	**Likely**	**Somewhat Likely**	**Unlikely**
clear authorization exists	likely impacts trigger regulatory oversight	dependent on impacts	nature of likely impacts insufficient to trigger oversight

* must not conflict with AUC, AER, NRCB authorizations (s. 619 *Municipal Government Act*)
** regulatory oversight
\# incidental take/harm to birds

Large-Scale Renewable Energy Projects: The Regulatory Framework

The majority of renewable projects are likely to engage one, or both, of two provincial government bodies: the Alberta Utilities Commission (AUC) enabled by the *Alberta Utilities Commission Act* and *Hydro and Electric Energy Act*[40] and Alberta Environment and Parks (AEP), the ministry responsible for administering *Water Act* approvals and environmental assessments under the *Environmental Protection and Enhancement Act* (*EPEA*). AEP also conducts their own approvals, which may be triggered during the AUC approval process.[41]

In addition, where power purchase agreements are put in place (i.e. large renewable projects) the Alberta Electric System Operator (AESO) will be involved.[42] AESO is responsible for running the provincial power grid, including any energy that is derived from renewable sources. To do this, the *Electric Utilities Act* was amended to include the renewable energy programs defined under the *Renewable Electricity Act.*[43] The *Electric Utilities Act* is a comprehensive statute that enables the province's wholesale electricity market, now including electricity generated by renewable sources.[44]

Together, these legislative changes have opened the door to increased renewable energy development.

[40] *Alberta Utilities Commission Act*, SA 2007, c A-37.2 [*Alberta Utilities Commission Act*]; *Hydro and Electric Energy Act*, RSA 2000, c H-16 [*Hydro and Electric Energy Act*].

[41] *Water Act*, RSA 2000, c W-3 [*Water Act*]; *Environmental Protection and Enhancement Act*, RSA 2000, c E-12 [*EPEA*].

[42] *Renewable Electricity Act*, s 2(1).

[43] *Electric Utilities Act*, SA 2003, c E-5.1 [*Electric Utilities Act*].

[44] *Electric Utilities Act*.

ARE RENEWABLES TOO COSTLY?

The *Electric Utilities Act* enabled AESO to run the Renewable Energy Program Rounds, auctions designed to source hundreds of megawatts of renewable energy at the lowest possible price, the first of which was announced on December 13, 2017.

Criteria for this 1st round included: generation suitable for 400 MW of power, no socio-economic requirements, and projects with a commercial operation date of December 2019. In the end, the government selected four wind projects, by three companies, to deliver 600 MW of wind generation and received a record-low price for wind energy generation – $37 per MW-hour or 3.7 cents per KW-hour. It was this record-breaking price that enabled the provincial government to fill 200 MW of extra power with this initial bid.

Two more rounds were announced in December 2018 and are scheduled to be operational by June 2021 with Round 2 focused on Indigenous involvement in the renewable energy sector. The goal is to produce 300 MW of power with a minimum of 25% Indigenous equity component for a minimum of 3 years.

Round 3 does not have these specifications and, rather, is a copy of Round 1. According to section 1(l) of the *Renewable Electricity Act,* projects developed under both Round 2 and Round 3 could take the form of any renewable energy including solar, wind, geothermal, hydroelectricity, or bioenergy.

Nigel Bankes, "Implementing the Capacity Market for Electricity in Alberta: Bill 13 and the AESO's CMD.2" (30 April 2018) ABlawg online: https://ablawg.ca/2018/04/30/implementing-the-capacity-market-for-electricity-in-alberta-bill-13-and-the-aesos-cmd-2/.

Regulatory Process under the Alberta Utilities Commission

The AUC is the body responsible for issuing approvals for the construction and operation of power plants; permits and licences to construct and operate transmission facilities; and notices of discontinuance if required to decommission power plants.[45] Applicable projects include hydroelectric, geothermal, bioenergy, and solar and wind projects that are not categorized as micro-generation.

Micro-generation is the small-scale production of electricity, using renewable energy sources. Although micro-generation is often created for personal consumption, any excess energy can be sent back to the electrical power grid for other consumers to use.[46] In Alberta, micro-generation is governed by the *Micro-Generation Regulation*[47], which, although implemented by the AUC, is not dependent upon AUC approvals. Rather, individuals contact their wire-service providers to approve micro-generation projects and only disputes make their way to the AUC.[48] You can find a more in-depth look at micro-generation below.

Power plants, however, *are* subject to AUC approval. The *Hydro and Electric Energy Act* defines a 'power plant' as, facilities for the generation and gathering of electric energy from any source.[49] This Act also establishes rules and requirements specifically for hydroelectricity and the generation and transmission of other forms of electricity in the province. Finally, the Act specifies that no person shall construct or operate a power plant unless approved by the AUC.[50]

Applications to the AUC, as required by the *Hydro and Electric Energy Act,* and for the construction and operation of power plants and substations, must also comply with the AUC's own rules, in particular Rule 007 and Rule 012.

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[45] Nick Bryanskiy, Jamie Salsman & Stephanie Ridge, "Environmental Aspects of Wind and Solar Projects in Alberta" (8 February 2018) Bennett Jones online: https://www.bennettjones.com/en/Blogs-Section/Environmental-Aspects-of-Wind-and-Solar-Projects-in-Alberta [Nick Bryanskiy].

[46] Alberta Utilities Commission, "AUC's role in micro-generation" online: http://www.auc.ab.ca/Pages/micro-generation.aspx [AUC's role in micro-generation].

[47] *Micro-Generation Regulation*, Alta Reg 27/2008 [*Micro-Generation Regulation*].

[48] AUC's role in micro-generation.

[49] *Hydro and Electric Energy Act*, s 1(1)(k).

[50] *Hydro and Electric Energy Act*, s 11.

- Rule 007 sets out the procedure for "Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Development." This rule sets out both the legislative and policy requirements that must be taken prior to a project getting AUC approval.[51] Rule 007 also includes specific directions for applications for solar, wind, hydroelectric, and thermal projects. Although it does not specifically refer to either geothermal or bioenergy, it could extend to these types of projects through the *Hydro and Electric Energy Act*'s definition of a power plant.[52] Currently, and in part due to a lack of any geothermal plants in the province, the only 'thermal plants' under consideration by the AUC are natural-gas power plants.

  Rule 007 also requires that, prior to the approval of a power plant that generates 10 MW or greater, applicants must provide notice to all occupants, residents and landowners within 2,000 metres as measured from the edge of the proposed power plant site and must provide personal consultation to all occupants, residents, and landowners within 800 metres of the proposed site. Rule 007 also sets out notice requirements for associated infrastructure or small micro-generators, although these may be less stringent than for large projects.[53] Notice requirements may be increased or decreased dependent on circumstances, such as increased interest in the project, and project proponents may also engage in public consultations, such as open houses. Rule 007 provides details for how, when, and who to consult with and project proponents can glean important information from this section; and

- Rule 012 outlines Noise Control requirements.[54] Requirements include a Noise Impact Assessment to ensure that the project will not exceed maximum allowable decibel levels before and during operation. In particular, Rule 012 includes additional requirements for wind turbine projects, above and beyond other renewable energy projects.[55]

[51] Alberta Utilities Commission, *Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments* (2 April 2018) online: http://www.auc.ab.ca/regulatory_documents/Consultations/2018-04-02-Rule007.pdf [Rule 007].

[52] *Hydro and Electric Energy Act*, s 11; Rule 007, s 1.3.

[53] Rule 007, s 5.

[54] Alberta Utilities Commission, *Rule 012: Noise Control* (4 July 2017) online: http://www.auc.ab.ca/regulatory_documents/Consultations/Rule012.pdf [Rule 012].

[55] Rule 012, s 3.3.

The AUC process also requires consideration and compliance with the *Historical Resources Act*.[56] This Act requires historical resource impact assessments before a development activity begins, in the event that the project may have an impact on Alberta's historic resources, including archaeological sites, paleontological sites, historic buildings and structures, and Aboriginal traditional use sites.[57] During its approval process, the AUC may require assurance from Alberta Culture and Tourism that no historical sites will be impacted or that any impact on these sites has been adequately mitigated

Regulatory Process under Alberta Environment and Parks

In conjunction with the AUC approval process, project proponents may also be required to seek and obtain approvals from AEP. Rule 007 sets out some of the cases where this may be required including if the applicant is proposing a major development or hydroelectric project and may require an environmental assessment or if the application is for a thermal power plant greater than 1 MW that requires an industrial approval application be submitted to AEP – among others.[58] Overall, in Alberta, power plant operators are expected to comply with the provincial *EPEA*.

Environmental Assessment of Renewables

The province's environmental assessment process can be found outlined in Division 1, Section 40 of the *EPEA.*[59] Environmental assessments under *EPEA* fall into three categories of activities; (1) activities

[56] *Historical Resources Act*, RSA 2000, c H-9.

[57] Alberta Arts and Culture, "Historic Resource Impact Assessment" Government of Alberta online: https://www.alberta.ca/historic-resource-impact-assessment.aspx.

[58] Rule 007, ss 1.5 & 3.2.

[59] *EPEA,* s 1(a).

for which an environmental assessment is required (i.e. mandatory); (2) activities which are exempt; and (3) all other *EPEA* regulated activities for which an environmental assessment may be required (i.e. discretionary).

EPEA is focused on regulating the environmental impacts of "activities" as defined by the Act. These activities are set out in the schedule to the Act and include references to the processing of wood products (relevant to bioenergy), the generating of thermal electric power or steam and the drilling of a well other than for water (both of which may trigger a requirement for geothermal assessments), the generating of wind electric power, the generating of solar electric power and the generating of hydro-electric power.

The scope of scrutiny each activity undergoes is dictated by whether an activity requires an environmental assessment (as described above), an approval, a registration or a notice, as set out in the *Activities Designation Regulation.* Schedule 2 of the *Activities Designation Regulation* sets out those activities that require approval, registration, or notice under *EPEA* and, notably, does not include any direct reference to solar, wind, bioenergy, and geothermal. There is, however, reference to a requirement for 'thermal' power plants, which could require an assessment for concentrated solar or for geothermal.

Additionally, the *Environmental Assessment (Mandatory and Exempted Activities) Regulation* sets out those activities for which an environmental assessment is required or exempt. For example, the Regulation requires an environmental assessment for dams greater than 15 metres in height, water diversion structures with a capacity of more than 15 cubic metres per second, water reservoirs with 30 million cubic metres or more of capacity, or a hydroelectric power plant with a capacity of 100 MW or greater – each of which may be included in a hydroelectric project.[60]

Exempt projects include wind or solar electric power plants with a total nominal capacity not exceeding 1 MW.[61] Further, many other renewable energy projects such as commercial solar farms are not listed as either mandatory or exempt, hence an environmental assessment may be discretionary.

Despite the fact that the Director retains the discretion to call for an optional environmental assessment process for non-mandatory renewable energy projects, the trend with recent non-

[60] *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Alta Reg 111/1993, ss 3(c), 3(d), 3(e) & 3(l) [*Environmental Assessment (Mandatory and Exempted Activities) Regulation*].

[61] *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, sched 2 (h).

hydroelectricity renewable energy projects has been to approve projects without undergoing the full environmental assessment process. Some recent projects that did not require an assessment include: a large-scale solar farm approved in Newell County, a 2012 bioenergy project built by Millar Western, and a wind power plant near Pincher Creek. Each of these projects received approval by the AUC without an approval or registration under *EPEA*.[62]

In the Newell County decision, the AUC specifically noted that *EPEA* did not apply because a solar or wind project would not be considered a designated activity pursuant to the regulation – thereby requiring no environmental assessment.[63] This may change if these projects become larger and more common so developers should be aware of the option to require an environmental assessment. This option arises because *EPEA* specifically enables the Director to initiate the environmental assessment process, despite an activity not being listed as a mandatory activity – as is the case with many renewable energy projects.[64]

Other Requirements for Alberta Environment and Parks Approvals

Another step in the approval process of a new renewable energy project is the requirement for a Renewable Energy Referral Report. These reports are issued by AEP and are periodically required prior to a final AUC approval. A Renewable Energy Referral Report is submitted by an AEP Wildlife Biologist and describes the mitigation efforts undertaken by the project developer to ensure that any environmental and health effects are minimized.[65] Required mitigation efforts can be found in

[62] Alberta Utilities Commission, "McLaughlin Wind Power Plant and Substation" (23 February 2018) online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2018/1976-D01-2018.pdf; Alberta Utilities Commission, "C&B Alberta Solar Development ULC – Newell Solar Power Plant" (15 November 2017) online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2017/22781-D01-2017.pdf [C&B Alberta Solar Development ULC – Newell Solar Power Plant]; Alberta Utilities Commission, "SunEEarth Alberta Solar Development Inc. – Yellow Lake Solar Project" (26 September 2017) online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2017/22422-D01-2017.pdf; Alberta Utilities Commission, "Millar Western Forest Products Ltd. – Biogas Power Plant" (5 June 2012) online: http://www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2012/2012-153.pdf [Millar Western Forest Products Ltd. – Biogas Power Plant].

[63] C&B Alberta Solar Development ULC – Newell Solar Power Plant at para 12.

[64] *EPEA*, s 44.

[65] Alberta Environment and Parks, *Wildlife Directive for Alberta Wind Energy Projects* (7 April 2017) AEP Fish and Wildlife 2016 No. 6, Government of Alberta online: http://aep.alberta.ca/fish-wildlife/wildlife-land-use-

government directives which set out the requirements for siting, monitoring, construction, and the standard mitigation of risks to wildlife and habitat. Notably, as of the time of writing, AEP has only released two directives specific to the solar and wind industry and has specified that these directives do not apply to any other industry, namely bioenergy, hydroelectric or geothermal.[66]

Another Act that may be triggered by the AUC approval process is the *Water Act*.[67] *Water Act* approvals are administered by AEP and may be required where the project requires a water licence either for the diversion or use of water, such as in hydroelectric projects, and where wetlands are impacted. The AUC will consider *Water Act* requirements depending on the circumstances at hand.

Throughout this entire process, project proponents are responsible for ensuring that adequate notice and opportunity for input is provided to all parties and stakeholders that may be potentially affected by a project. *EPEA* and the associated *Environmental Protection* and *Enhancement (Miscellaneous) Regulation*, along with Rule 007 of the AUC process, outline the requirements for valid regulatory notice.[68]

guidelines/documents/WildlifeWindEnergyDirective-Apr07-2017.pdf [*Wildlife Directive for Alberta Wind Energy Projects*]; Alberta Environment and Parks, *Wildlife Directive for Alberta Solar Energy Projects* (4 October 2017) AEP Fish and Wildlife 2017 No. 5, Government of Alberta online: http://aep.alberta.ca/fish-wildlife/wildlife-land-use-guidelines/documents/Directive-SolarEnergyProjects-Oct04-2017.pdf.

[66] Alberta Environment and Parks, "Wildlife Directives for Alberta Renewable Energy Projects: Frequently Asked Questions" (October 2017) Government of Alberta at 2 online: http://aep.alberta.ca/fish-wildlife/wildlife-land-use-guidelines/documents/FAQ-SolarAndWind-Oct-2017.pdf.

[67] *Water Act*.

[68] *Environmental Protection* and *Enhancement (Miscellaneous) Regulation,* Alta Reg 118/1993, ss 2 & 3; *EPEA*, s 72. According to the *EPEA*, valid regulatory notice is required as set out in Section 72. The details of which can be found in Sections 2 and 3 of the Regulations and require that the project proponent publish notice of the application in one or more issues of a newspaper in the area or provide notice to the affected persons in any manner determined appropriate by the Director. This section also sets out the necessary information that must be included in this notice. In response, Section 73 of *EPEA* enables directly affected persons to issue Statements of Concern to the Director, setting out their concerns with respect to the application and proposed project.

Private Land Considerations & Renewable Energy

Legal considerations will be central to how renewables are developed on private land, particularly where the development is undertaken by a third party such as when landowners lease out land to a renewable energy company.

In considering whether to agree to a renewable energy lease, landowners and the lessor will have a variety of legal concerns that should be addressed. Retaining a lawyer would be an important step to ensure the rights and obligations of all parties are addressed. Consideration of potential liability to third parties will also be a central concern to the landowner and lessor.

Landowners making lease agreements with renewable energy companies are not subject to the same legislative and regulatory framework currently in place for oil and gas or other non-renewable energy projects.

Application of Surface Rights Legislation to Renewables

There is currently no right of entry nor is there an expropriation process for renewable energy projects in Alberta. This means that if a renewable energy company approaches a landowner, it is up to the landowner to say yes or no to a renewable energy lease on their land. Unlike with an oil and gas well, if the landowner says no, they do not have to be concerned that the renewable energy company will show up at a later date with a right of entry and begin construction. This is because there is no recourse to the Surface Rights Board to request one.

Additionally, while the *Surface Rights Act* will still apply to any infrastructure associated with the project, for example, any infrastructure that is required to connect the power plant to the Alberta energy grid,[69] the *Surface Rights Act* does not apply to those renewable energy leases that are initiated. This means that any protections that would be awarded both to landowners and to project proponents under this Act, do not apply. Some of these protections include: appeals to the Board in the event that the operator does not pay adequate compensation to the landowner or the termination of a right of entry in the event that the operator does not begin work on the land, both of which apply when entering into a lease with an oil and gas company.[70]

This also means that a contract between the landowner and the renewable energy company, if broken, can only be enforced through the contract's terms. This may allow for legal action in the courts or may enable a mediation or arbitration process, in the event that one party feels that the contract has been breached.

Finally, there is no equivalent Orphan Wells Association for renewable energy. Without an equivalent organization, there is no financial accountability to ensure that a renewable energy company is fiscally sound and there is no association that could help with clean-up or restoration, should the company go bankrupt before reclaiming the land.

All of this means that landowners will lack some of the legislative and regulatory protections currently in place for oil and gas or other non-renewable energy projects. If a renewable energy company decides to act improperly in their dealing with the landowner, the only recourse will be the courts.

Property taxes

Lease agreements that set up a renewable energy project on private land may also result in certain tax implications. There are two components to the applicable taxes on these properties – taxes on the infrastructure and taxes on the land. Taxes on the infrastructure would be sent directly to the developer as linear property, however, payment of taxes on the land would need to be specifically addressed in the contractual agreement or they may become the sole responsibility of the landowner. For example,

[69] *Surface Rights Act*, RSA 2000, C S-24, ss 1 & 12 [*Surface Rights Act*]; Alberta, Minister of Agriculture and Forestry, *Renewable Energy in Alberta*, (Alberta: Farmers' Advocate Office, 2017) at 17-18 [Farmers' Advocate Office].

[70] *Surface Rights Act*, ss 27(1) and 28(1).

a contract can state that both parties will receive tax notices but that the developer will be responsible for payment of taxes on the land, throughout the life of the project.[71]

There may also be other federal or provincial tax implications that come with signing a renewable energy lease and both the landowner and developer should speak to an accountant or lawyer prior to agreeing to a contract. The landowner may also be responsible for taxes should the developer go insolvent and should understand any potential legal and financial obligations beforehand.

There may be federal or provincial tax implications that come with signing a renewable energy lease and both the landowner and developer should speak to an accountant or lawyer prior to agreeing to a contract.

Reclamation

A recent order-in-council amended the *Conservation and Reclamation Regulation*[72] to incorporate renewable energy projects including solar, wind, hydro, geothermal, and biomass into the reclamation regime. This regulation came into force on June 15, 2018, and codified the reclamation requirements for renewable energy projects.[73] These changes expanded the definition section in the previous *Conservation and Reclamation Regulation* to include renewable energy projects including moving water, wind, heat from the earth when used for electrical power generation, sunlight, and sustainable biomass.[74] The definition of 'specified land' was also expanded to include renewable energy projects and ensure that they are subject to the Duty to Reclaim in *EPEA*.[75]

The regulatory details accompanying this Order in Council, were released in September 2018 in the document "Conservation and Reclamation Directive for Renewable Energy Operations." This directive

[71] Farmers' Advocate Office at 18.

[72] *Conservation and Reclamation Regulation*, Alta Reg 115/1993.

[73] *Conservation and Reclamation Amendment Regulation*, OIC 131/2018, (2018) AR 62/2018 [*Conservation and Reclamation Amendment Regulation*].

[74] *Conservation and Reclamation Amendment Regulation*, s b.

[75] *EPEA*, s 137.

came into force on September 14, 2018, and applies to renewable energy projects, including wind, solar, and heat from the ground, located on private land.[76]

Although the details rely on previously established reclamation criteria, rather than criteria established specifically for renewable energy projects, they do specify those requirements necessary for a renewable energy reclamation certificate application. [77] This includes a checklist, found in Appendix D of the regulation, which provides a helpful list of all the information that will be required prior to a reclamation certificate being issued.

The details released in conjunction with the regulation help clarify the steps necessary for the reclamation of past renewable energy projects and will, ideally, encourage further renewable energy development through a more streamlined process. However, there are some areas that still lack enforceability such as:

- a specific focus on the importance of environmental and ecological integrity as a primary goal, particularly when reclamation is occurring on protected land;
- an enforceable focus on reclamation back to the original land use, whenever possible;
- a strong and consistent implementation process to ensure that data about reclamation is well collected; and
- an enforceable mitigation hierarchy with avoidance coming before mitigation, whenever possible.

Despite these developments, at this time Alberta has a general lack of experience with the clean-up of renewable energy developments. Alberta is only now getting to the point where the first wave of developments is reaching the end of their use and the details released in conjunction with this regulation may need to provide an opportunity for review and updates, as necessary.[78]

[76] Alberta Environment and Parks, "Conservation and Reclamation Directive for Renewable Energy Operations" (14 September 2018) Government of Alberta online: https://open.alberta.ca/dataset/8c4e8ed9-a9bb-4a1e-8683-8136b33f8dff/resource/f1704d4c-78af-4de3-91da-d9873e9f50a4/download/direct-renewenerop-sep14-2018.pdf [Conservation and Reclamation Directive for Renewable Energy Operations].

[77] Conservation and Reclamation Directive for Renewable Energy Operations.

[78] Conservation and Reclamation Directive for Renewable Energy Operations at iii-iv.

Small-Scale Renewable Energy Projects: The Regulatory Framework

As described above, individual solar panels or mini wind turbines, along with other micro-generators that are not connected to the grid, would not trigger the same legislative framework as larger projects. Rather, these smaller units, including those connected to the electricity grid would be governed by either the *Micro-Generation Regulation* or the *Small Scale Generation Regulation*.[79]

The *Micro-Generation Regulation* allows micro-generators (generators limited by size) to generate their own electricity and connect to the grid. They can do so both to ensure they have energy in times of low production and to enable them to send energy back onto the grid, in the event of high production.

In 2017, the reach of the *Micro-Generation Regulation* was expanded with amendments to allow small micro-generators, those under 150 KW, to be credited for the electricity sent back to the grid on a monthly basis and at their retail rates.[80] Meanwhile, large micro-generators, sized 150 KW and above, are credited for the electricity sent back to the grid at the hourly wholesale market price.[81] The size of applicable micro-generators also increased from a previous maximum size of 1 MW to a new maximum

[79] *Micro-Generation Regulation*; *Small Scale Generation Regulation*, Alta Reg 194/2018 [*Small Scale Generation Regulation*].

[80] *Micro-Generation Regulation*, s 7(5)(a).

[81] *Micro-Generation Regulation* s 7(5)(b).

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.[82]

These changes enabled more organizations to take advantage of the incentives provided under the regulation, thereby increasing renewable energy usage in the province and potentially even increasing the amount of renewable energy being sent back onto the grid.

In addition to micro-generators, the new *Small Scale Generation Regulation* is designed to encourage small scale and community renewable energy projects.[83] This regulation came into force in January 2019, with the application process opening later in the year.[84] The *Small Scale Generation Regulation* sets out to streamline the process for small scale units – those in between micro-generators and utility scale energy producers – to receive investment and approval for new generating units.

The regulation applies to small scale generating units and community generating units, the latter of which must demonstrate the community benefits stemming from the project, in order to be approved.[85] Additionally, units must generate renewable energy, including solar, wind, hydro, fuel cell, geothermal, biomass, or other low emissions intensity energy.[86]

The regulation is quite new and details such as the criteria for acceptance into the program, as well as, the application process itself, have yet to be written. However, it is a step towards creating more opportunities for small-scale renewable energy. Currently, renewable energy in the province is often lacking in streamlined regulatory procedures and increased clarity in this area will help to achieve the Climate Leadership Plan's goal of 30% renewable energy.[87]

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[82] Kent D. Howie & Steven Bodi, "Increasing Micro-Generation in Alberta: A Step in the Right Direction" (8 February 2017) Alberta Power Market online: https://albertapowermarket.com/2017/02/08/increasing-micro-generation-in-alberta-a-step-in-the-right-direction/.

[83] *Small Scale Generation Regulation*.

[84] Energy Efficiency Alberta, "Community Generation Online Resource Hub" online: https://www.efficiencyalberta.ca/commgen/.

[85] *Small Scale Generation Regulation*, ss 1(d) & (m).

[86] *Small Scale Generation Regulation*, s 1(l).

[87] Government of Alberta, "Climate Leadership Implementation Plan 2018-19" (June 2018) online: https://open.alberta.ca/dataset/da6433da-69b7-4d15-9123-01f76004f574/resource/b42b1f43-7b9d-483d-aa2a-6f9b4290d81e/download/clp_implementation_plan-jun07.pdf.

FEDERAL REGULATORY FRAMEWORK

Renewable energy projects on federal lands, within migratory bird sanctuaries, within a prescribed wildlife area, or that cross provincial boundaries may trigger the need for a Canadian environmental assessment.

In conjunction with the provincial regulatory bodies, there are certain federal statutes that may be triggered during the approval process for renewable energy projects. Overall, projects on federal lands, within migratory bird sanctuaries, within a prescribed wildlife area, or that cross provincial boundaries may trigger the need for a federal environmental assessment, according to the *Canadian Environmental Assessment Act, 2012*.[88]

Although the two levels of government are meant to work together to streamline the assessment process and to ensure there is no unnecessary overlap, this is not always successful. A project may require both a federal and provincial assessment, or neither at all. We will also have a clearer picture of the future assessment process if the *Impact Assessment Act* (currently known as Bill C-69) is passed (with any changes) and if passed, once the Federal Government releases the accompanying regulations. However, even if *CEAA, 2012* remains in place, the federal assessment process may apply regardless of whether or not the provincial environmental assessment process is triggered.

In addition to the federal environmental assessment process, if a renewable energy project is being built to operate an international or interprovincial electricity line and to export electricity, the project must also ensure that it is compliant with the *National Energy Board Act* - the federal legislation that governs electricity lines as soon as they cross a border.[89] The National Energy Board (NEB), under this Act, is responsible for the, "regulation of pipelines, energy development, and trade in the Canadian public interest".[90] In particular, the NEB governs the exportation of electricity including how much can

[88] *Canadian Environmental Assessment Act*, 2012, SC 2012, c 19 [*CEAA, 2012*].

[89] *National Energy Board Act*, RSC 1985, c N-7 [*National Energy Board Act*].

[90] National Energy Board, "Who we are – Responsibilities" (1 December 2016) Government of Canada online: https://www.neb-one.gc.ca/bts/whwr/rspnsblt/index-eng.html.

be exported based on weather, environmental factors, and domestic demand.[91] The *National Energy Board Act* is also up for review, with changes proposed in the form of the *Canadian Energy Regulator Act.*[92]

Other federal statutes that may be invoked by renewable energy project development include, the *Navigation Protection Act*,[93] the *Migratory Birds Convention Act, 1994 (MBCA,1994)*,[94] *Fisheries Act*,[95] and the *Species at Risk Act (SARA)*,[96] among others. Although these acts will not apply to all projects, developers should be aware of the potential for federal statutes to arise during the AUC and AEP approval processes.

SOLAR

Solar energy can be harnessed in both passive and active ways. Passive solar energy is used to heat a building through the proper placement of windows (that act as a solar collector) and passive heating architecture including high-efficiency equatorial-facing windows and large internal thermal mass.[97] Active thermal systems utilize a solar collector which can harness solar energy to heat water, provide

[91] National Energy Board, "Responsibilities – Export and Import of Energy" (1 December 2016) Government of Canada online: https://www.neb-one.gc.ca/bts/whwr/rspnsblt/xprtmprt-eng.html.

[92] Bill C-69, *An Act to enact the Impact Assessment Act and the Canadian Energy Regulator Act, to amend the Navigation Protection Act and to make consequential amendments to other Acts*, 1st Sess, 42nd Parl, 2018 (as passed by the House of Commons 20 June 2018) [Bill C-69].

[93] *Navigation Protection Act*, RSC 1985, c N-22 [*Navigation Protection Act*].

[94] *Migratory Birds Convention Act*, 1994, SC 1994, c 22 [*MBCA, 1994*].

[95] *Fisheries Act*, RSC 1985, c F-14 [*Fisheries Act*].

[96] *Species at Risk Act*, SC 2002, c 29 [*SARA*].

[97] Natural Resources Canada, "About Renewable Energy" (29 June 2016) Government of Canada online: http://www.nrcan.gc.ca/energy/renewable-electricity/7295#what [Natural Resources Canada, "About Renewable Energy"].

heat and electricity for buildings, or run a cooling system.[98] The following section will focus on active solar energy, however, harnessing passive solar energy can be a valuable tool in increasing energy efficiency.[99]

Residential vs Commercial Solar Installation

Residential solar can be installed in two forms, grid-tied or off-grid. In both forms, a solar collector is installed to collect solar energy and transform it into either heat or electricity. A grid-tied solar photovoltaic (PV) system is a system in which any excess solar production not used by the residence is sent back onto the electrical grid. Similarly, during periods of insufficient solar production, any electricity needed for the residence can be taken from the regular utility grid. In contrast, an off-grid solar PV system does not use the utility grid. Rather, when excess electricity is generated it gets stored in a battery which can then fuel a backup generator to produce enough electricity during times of low solar production.[100]

Commercial solar works differently because its purpose is to provide electricity directly for the grid. Solar panels are set up in large groupings and built in areas that receive high levels of solar energy. All of the electricity generated is sent onto the grid to be used by consumers who either do not have their own solar panels or who need an extra top-up during times of low solar energy.

Most of the regulatory framework that exists for renewable energy in Alberta, as discussed above, applies to commercial rather than individual solar projects. For example, the *Hydro and Electric Energy Act* sets out the approval process for large-scale, commercial projects but does not apply to a person generating electric energy solely for the person's own use.[101] The following section on solar will outline some of the legislative or regulatory constraints that may apply to individual solar power systems.

[98] Natural Resources Canada, "About Renewable Energy".

[99] Ottmar Edenhofer at 10.

[100] Solar Energy Society of Alberta, "Solar Basics" (5 September 2015) online: https://solaralberta.ca/faqs .

[101] *Hydro and Electric Energy Act*, s 13(1).

Brooks Solar Project in the County of Newell

The Brooks Solar Project – called the Brooks Solar 1 Facility on the Emissions Reduction Alberta website, is a brand-new solar project located near Brooks in southeast Alberta. It launched in mid-December 2017, after five years of planning, and is the first utility scale solar facility in Western Canada.

It is comprised of 50,000 solar panels on 30 hectares located off the highway. The goal is that the 50,000 solar panels will produce enough energy to power 3,000 homes. The facility is located on multi-use land alongside a number of oil wells and was funded by the previous government's Emissions Reduction Alberta project.

(Kyle Bakx, "Alberta renewable revolution begins with launch of largest solar project in Western Canada" (22 December 2017) CBC News)

What are some of the legal considerations specific to solar in Alberta?

Residential Zoning Issues

The Town of Millet is leading in solar legislation with their Land Use Bylaw 8.8(4). This bylaw guarantees a right to sun, stating 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".

Currently, a number of Albertan municipalities are in the process of amending their development and land bylaws to consider solar collectors. Previously, it was the norm to require a development permit prior to being able to erect a solar collector on a building, which created an extra step for home and

business owners who wished to improve their energy efficiency.[102] In response, municipalities are now deciding whether they will require a development permit before allowing solar technology installation or if they will allow it to be installed on homes and buildings without a separate permit. Permitting processes will also need to consider any restrictions on the height and shape of solar collectors in order to provide clarity on how and where solar panels can be installed. There is currently a gap between the Government of Alberta's encouragement of solar installation and the actual work being done. This gap is due, in part, to the issues that arise when dealing with installation and permitting procedures.[103]

Municipalities that have already begun this process have usually done so by first defining where and how a solar collector can be installed and have altered their zoning bylaws accordingly. Currently, the Town of Millet is leading in solar legislation with their Land Use Bylaw 8.8(4). [104] This bylaw guarantees a right to sun, stating 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".[105] This bylaw effectively guarantees access to solar energy for those individuals who choose to install a solar collector on their property – perhaps in conjunction with one of the provincial incentive programs currently available.

After ensuring that relevant bylaws and zoning policies help to encourage, rather than stifle, new solar development, the next step for zoning should be focused on how to make future homes more solar compatible. Currently, homes are not being built with solar capacity in mind and only about 30% (as of 2014) of homes in Edmonton were solar compatible.[106] This could mean that homes are not facing the right way to take full advantage of solar energy or that they do not have the required roof orientation to allow for solar panel installation. Municipalities may need to consider zoning bylaws both for new

[102] Elise Stotle, "Solar tiles prompt Edmonton to trim rules for new installations" *Edmonton Journal* (13 January 2017) online: https://edmontonjournal.com/news/local-news/solar-tiles-prompt-edmonton-to-trim-rules-for-new-installations.

[103] Lydia Neufeld, "Edmonton poised to let sun shine on city's solar industry" *CBC News* (26 March 2017) online: http://www.cbc.ca/news/canada/edmonton/solar-energy-city-edmonton-bylaw-1.4040528 .

[104] Town of Millet, revised by-law #2011/05, *Land Use By-Law* s 8.8(4) [Town of Millet].

[105] Town of Millet.

[106] 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].

neighbourhoods and for infills that encourage solar use, including zoning roof line and house orientation.[107]

Although requirements of this sort would be helpful, they would likely be more of an issue for neighbourhoods with design and/or historic district zoning guidelines. It may, in fact, be impossible to incorporate solar panels on historic homes that allow for limited design changes. This could mean that any incorporation of solar into these neighbourhoods would be limited to solar suitability that keeps the integrity of historic homes intact.[108]

The PACE program, outlined above, will, if fully implemented, likely have positive effects for the future installation of personal solar collectors.[109] One of the purposes of PACE is to make renewable energy options more affordable for the average homeowner – a concern that has affected renewable energy use in the past.

Commercial Zoning Issues

Currently, there are no commercial solar farms located within Albertan urban municipal boundaries, however, the first may soon be under construction with the approval of a new EPCOR solar project in Edmonton. This project, approved by the AUC in February 2019 is set to be constructed south of the existing E.L. Smith Water Treatment Plant and is designed to generate energy for the treatment plant, as well as, to be sent back to the grid.[110]

This project has helped to clarify what the process of zoning for commercial solar in municipalities could be. For example, in Edmonton, a commercial solar farm would need to be on land zoned as a Public Utility Zone. In the case of the proposed EPCOR farm, EPCOR needed to first apply to rezone the proposed area from a Metropolitan Recreation Zone to a Public Utility Zone, to allow for development

[107] C3 – Energy. Ideas. Change. at 15-16.

[108] C3 – Energy. Ideas. Change. at 18.

[109] Bill 10.

[110] EPCOR, "EPCOR Receives AUC Regulatory Approval to Build & Operate Solar Farm at E.L. Smith" (22 February 2019) online: https://www.epcor.com/about/news-announcements/Pages/e-l-smith-water-treatment-plant-approval.aspx [EPCOR Receives AUC Regulatory Approval to Build & Operate Solar Farm at E.L. Smith]; EPCOR, "E.L. Smith Solar Farm" online: https://www.epcor.com/products-services/infrastructure/construction-projects/el-smith-solar-farm/Pages/default.aspx.

and construction.[111] EPCOR is still waiting for approval of its Land Development Application from the City of Edmonton.[112]

National Building Code of Canada

Currently, solar collectors are not commonly included in home construction plans and may not be taken into account when designing roof and other construction warranties. As solar energy becomes more common and is further encouraged, it may be important to consider solar collectors when designing fire safety systems and roof loads. In particular, roofs should be designed to accommodate properly installed collectors or at least be warranted to accommodate them. This must be reflected in solar ready programs and regulations which can help to ensure that roof warranties are not void.[113]

One of the easiest ways to ensure these standards are clear is to include them in the *National Building Code of Canada*. Recently, the Canadian Commission on Building and Fire Codes, Canadian Home Builders Association and other stakeholders began a review process on the impact that the installation of solar collectors would have on wind and snow loads on roofs. [114] Changes resulting from this review would ideally be included in a National Building Code update.

Changes to the building code were successful in Tucson, Arizona when, in 2009, the Mayor and City Council released an ordinance that required all new single-family homes and duplexes to include a plan for a PV system and a solar water heating system, or preparation for later installation of these systems, in their building plans. [115] These plans were required before a building permit was issued. Although the *Alberta Building Code* has recently been amended to ensure more energy efficiency, the changes do not yet focus on enabling the installation of solar panels or other renewable energy updates.

Alberta's cities are developing quickly and changes to our building codes could be an opportunity to increase the number of homes readily available for solar energy, which in turn could lower the costs associated with solar collector installation through increased competition and use. Not only would this

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[111] EPCOR, "E.L. Smith Solar Farm Regulatory Process" online: https://www.epcor.com/products-services/infrastructure/construction-projects/el-smith-solar-farm/Pages/regulatory-process.aspx.

[112] EPCOR Receives AUC Regulatory Approval to Build & Operate Solar Farm at E.L. Smith.

[113] C3 – Energy. Ideas. Change. at 16.

[114] C3 – Energy. Ideas. Change. at 17.

[115] C3 – Energy. Ideas. Change. at 15-16; Planning and Development Services Tucson, "Solar Ready Ordinance: Ordinance no. 10549" City of Tucson online: https://www.tucsonaz.gov/files/pdsd/permits/Solar_Ready_Summary.pdf.

mean that new homes are being built with solar capability but also that the cost of solar infrastructure would go down. Additionally, the initial cost of this program would also be lower because it is much less expensive to outfit a new home with solar potential than it is to retrofit an existing structure. Changes like this may also be easily incorporated into the PACE program, described in the Energy Efficiency section, above.

Tax Credits

Tax credits have been successful at lowering the costs associated with solar energy production in the United States and would be a useful tool in Alberta. The American Solar Investment Tax Credit (ITC) began in 2006 and was so successful that it was renegotiated in 2015 for a further six years.[116] It consists of a 30% tax credit for solar systems on residential and commercial properties and it has helped annual solar installation grow by over 1,600%, or a compound annual growth rate of 59%, throughout the United States.[117] This success shows that stable, long-term incentives reduce prices and help to create both jobs and interest in the solar industry. The Canadian Solar Industries Association has also expressed their support for increased tax credits for solar and have been working to incorporate new tax programs into government policy and legislation.[118]

Land Constraints

Solar power is one of the most land-intensive forms of renewable energy. For example, a solar project can require up to seven acres for every MW of energy produced. This can be compared to a wind turbine where a footprint ranging from half an acre to one and a half acres provides an energy capacity of greater than two MW.[119]

Solar projects also limit surrounding land use on rural land or farmland. For example, the only animal that can be effectively grazed underneath solar panels are sheep.[120] Solar power may therefore be

[116] 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]

[117] Solar Energy Industries Association.

[118] Canadian Solar Industries Association, "Roadmap 2020: Powering Canada's Future with Solar Electricity" (December 2014) at 10 online: http://www.cansia.ca/uploads/7/2/5/1/72513707/cansia_roadmap_2020_final.pdf [CANSIA]; Solar Energy Industries Association, "Solar Investment Tax Credit (ITC)" online: https://www.seia.org/.

[119] Farmers' Advocate Office at 7.

[120] Farmers' Advocate Office at 7.

more effectively used in urban settings where large developments can be used for substantial solar programs, through the installation of solar panels on the roofs of buildings, rather than on undeveloped or agricultural land. Regardless, the land intensive nature of solar projects should be considered when zoning for and developing commercial solar projects.

Drake Landing Solar Community in Okotoks, AB

Drake Landing is a group of 52 free-standing homes in Okotoks and is the first large scale solar community in North America to use borehole thermal energy storage for residential heating. This means that the community uses solar heat collectors with seasonal heat storage, energy-efficient house design and construction, and a low temperature district heating network to heat the homes through solar power. The key to this project, and what makes it unique, is that the solar heat is captured by collectors and then stored underground until required. This means that solar energy can be used to heat the homes even in times of low solar energy, such as at night or throughout the winter.

Since their instalment in 2007, these houses have been consistently monitored by Natural Resources Canada and have exceeded expectations for energy use and efficiency. The solar panels are providing well above 90% of space heating requirements, even throughout the winter months. Natural Resources Canada is now moving on to studies for a new project in Okotoks and developers believe that a larger scale project of this sort would be cost feasible.

Bruce Sibbitt et al, "Groundbreaking Solar – Case Study Drake Landing Solar Community" (Summer 2015) High Performing Buildings online: http://www.hpbmagazine.org/attachments/article/12213/15Su-Drake-Landing-Solar-Community-Alberta-Canada.pdf; Bruce Sibbitt et al, "The performance of a high solar fraction seasonal storage district heating system – five years of operation" (2012) Energy Procedia at 30 online: http://www.sciencedirect.com/science/article/pii/S187661021201613X; Monty Kruger, "Drake Landing: A ray of sunshine for solar thermal energy" *CBC News* (15 February 2016) online: http://www.cbc.ca/news/canada/calgary/solar-thermal-energy-community-alberta-drake-landing-1.3436178.

Common Law Considerations

The Right to Sun

The English common law, which contributed directly to Canadian law and particularly to Canadian property law, recognizes a person's right to access light previously accessible to them. This means that an individual can ask the courts for a remedy if their access to light is being impeded. In fact, this is a right which is still being litigated in the United Kingdom today. The Court of Appeal for England and Wales has heard cases on the right to light as recently as 2016 when in *Ottercroft Ltd v Scandia Care Ltd*, the Court upheld a mandatory injunction against a developer who infringed an adjoining owner's right to light.[121]

However, in contrast to the English courts' recognition of a common law right to light, any such right was specifically eliminated in Alberta through the *Law of Property Act* and no similar right has been created since.[122]

Although the idea of a 'right to light' did not seem to be an issue in Alberta before the advent of solar panels, the lack of any right mirroring the English common law version, means that, today, in Alberta, there is no property right to sunlight. In other words, although anyone can make use of accessible sunlight, they have no right to the same. So, what does this mean for the potential increase of solar energy usage in the province?

Suppose someone lives beside a bungalow and decides to install solar panels on their roof. Once done, the neighbours on the adjoining property build a tall, three storey home, completely blocking the bungalow's previous access to sun and thereby limiting use of the recently installed solar panels. Without a right to sun, home owners cannot prevent a neighbouring landowner from building on their own property and thereby reducing or eliminating access to sunlight, meaning that their expensive solar panels may no longer be useful.

Currently, Millet has, through their bylaws, attempted to restore this right, however, without a similar bylaw, landowners would be forced to resort to a common law remedy in order to receive any damages

[121] *Ottercroft Ltd. v Scandia Care Ltd. and Dr. Mehrdad Rahimian* [2016] EWCA Civ 867.

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

for a loss of sunlight.[123] Unfortunately, this is still a new concept and a lawsuit to enforce this right after the fact may be unsuccessful.

The next section will examine some legal opportunities and challenges associated with the enforcement of a right to sun.

Easements and Restrictive Covenants

After building a structure on which solar technology has been installed, a landowner can purchase a negative easement on the adjoining property. This legal instrument allows the landowner to restrict activities on an adjoining piece of land, which could include restricting the height of nearby buildings to ensure that solar access is maintained. This negative easement could be acquired by an express grant, implied grant, or by prescription and would apply to all future landowners, even after the land is sold.[124] Continuity is ensured because an easement is registered on title and follows the land, not the landowner.

Restrictive covenants are another, potentially more effective option to protect one's right to sun.

A restrictive covenant is an agreement that can be made between landowners in a community.[125] For example, a community can get together and agree to place a restriction on their collective property that restricts the height of all homes in the area. Restrictive covenants may be implemented by community members or by a developer. They are also registered on title and apply to future landowners.[126]

A restrictive covenant may be beneficial because it can apply to larger areas than an easement.[127] However, it can be difficult to obtain because, before they can be effectively implemented, everyone in the community would need to be agreeable to the proposal. A restrictive covenant is only effective

[123] Ronald M. Khrulak, "A Legal Review of Access to Sunlight in Sunny Alberta" The Alberta Environmental Research Trust (1981) at 4 [Khrulak].

[124] Khrulak at 10.

[125] Khrulak at 7-8.

[126] Khrulak at 8.

[127] Khrulak at 8.

at setting the tone in a neighbourhood if multiple parties get on board and therefore may be more conducive to future developments, rather than established neighbourhoods. For example, when constructing future neighbourhood developments, a developer could place a restrictive covenant over an entire neighbourhood, setting out future building restrictions and protecting solar access for all homes in the development. [128]

There are, however, challenges to enforcing both easements and restrictive covenants. The difficulty that arises with both these legal instruments is that they can only be enforced through court action. This means that even if you have an easement or restrictive covenant in place, you cannot do anything to prevent someone from breaching it. Rather, you can only rely on court proceedings, started after the breach has occurred and which can generally only offer damages. This occurs in part because municipalities do not keep restrictive covenants or easements on file and are not required to comply with any existing restrictive covenants or easements when drafting zoning bylaws or when approving new developments.[129] Additionally, litigation can be both costly and time consuming and may not be an option for all landowners.

Furthermore, there is still no case law that deals with a right to sun in the context of a solar collector. This would make it much more difficult to predict how a court would decide, should a landowner attempt to enforce their easement or restrictive covenant.

It is also unclear whether a right to sun could be enforced as an incorporeal hereditament. An incorporeal hereditament is an item of property that may be passed down by inheritance. Generally, easements are regarded as incorporeal hereditaments, which means that they would remain intact upon the death of the owner and it is likely that an easement for solar access would be treated the same way. However, there is no case law of this kind, causing some uncertainty for landowners.

Another issue that can arise with restrictive covenants, is how difficult it can be to amend them in the future. Updating a restrictive covenant may require the consent of multiple landowners which may be difficult to achieve and could limit a neighbourhood's ability to adapt to changing technology or city planning techniques.

[128] Khrulak at 9.

[129] Residential Infill – City of Edmonton, "Restrictive Covenants" (7 April 2017) online: https://www.cityofedmontoninfill.ca/about/news/post/restrictive-covenants.

Nuisance

Nuisance is defined as the "unreasonable interference with the use and enjoyment of land."[130] It is a tort, or civil law action, that provides landowners with the opportunity to access the courts in order to prohibit or force a neighbouring landowner to change behavior that is negatively affecting the use and enjoyment of their land.

In the case of a right to sun, a landowner may be able to sue a neighbour for erecting a structure that interferes with a solar collector. However, a solar collector would first need to be considered a reasonable use of the land. As of today, there is no case law to that effect. Rather, the leading case on the right to sun and its implications for the tort of nuisance is *Earl Putnam Organization Ltd v Macdonald*.[131] In this case, the Court found that there was no cause of action for private nuisance for the right to light.[132] However, this case may be distinguished on the basis that the right to light being requested in *Earl Putnam* was for enjoyment, rather than for powering or heating a home through the use of a solar collector.

Public Nuisance

The tort of public nuisance has similar elements to the tort of private nuisance. However, in order to find that public nuisance has occurred, an action must inconvenience many people and offend the public interest.[133] It is likely that before the tort of public nuisance could be used to enforce a right to sun two changes would need to occur. First, there would need to be more recognition of a solar collector's use. Second, there would need to be more commercial solar use because a finding of public nuisance must affect a significant number of people – for example through interference with a solar farm.[134]

[130] Bruce Pardy, *Environmental Law: A Guide to Concepts* (Toronto: Butterworths Canada Ltd. 1996) at 193.

[131] *Earl Putnam Organization Ltd v Macdonald* (1978) 21 OR 815 [*Earl Putnam Organization*].

[132] *Earl Putnam Organization*.

[133] Khrulak at 17.

[134] Khrulak at 17.

Trespass

Trespass is defined as the intentional direct invasion of real property (land). In order to find trespass, damage to the land does not need to be shown but there must be evidence that the land is privately owned and that it was intentionally trespassed upon. For our purposes, trespass may be used to enforce one's right to sun, because of the common law rule that a landowner owns the airspace directly above their property. 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 properly using a solar collector.[135]

The difficulty in proving trespass occurs, in part, because of the angle of the sun in Alberta. Due to its northern latitude, the sun does not descend straight down onto the earth, but rather it descends on an angle, which also means that it passes through the airspace of another property before getting to the property in question.[136] Therefore, trespass would likely only be effective in cases of substantial land ownership where the sun's rays do not need to pass over another piece of land before reaching a solar collector.

Notably, there is no case law that helps to predict the rate of success that people would have in bringing these claims and along with this unpredictability, litigation is cost-prohibitive. A better option, and one that would make the business model for solar developers more appealing, would be to have solar access legislation in place.

However, when it comes to solar access legislation, one of the first questions that arises is whether this legislation should be created at the municipal or provincial level. There is some argument that the more streamlined the approach, the easier it will be to implement – therefore a provincial legislation may be ideal. However, there are difficulties that come with attempting to create a one size fits all solar access rule for Alberta. As just one example, can and should solar access be mandatory in a province with cities and towns as far north as High Level or others?

[135] *Didow v Alberta Power Limited*, 1988 ABCA 257.

[136] 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.

Solar Energy Programs in Canada

- **On-Farm Solar Photovoltaics/On-Farm Energy Management Sub-Program**: Farms can apply for government grants under this program, to help with the implementation of solar power on their properties;
- **Alberta Indigenous Solar Program**: This program provides grants to Indigenous communities or Indigenous organizations to install solar PV systems on facilities owned by the community or organization;
- **Alberta Municipal Solar Program**: This provides financial incentives to municipalities who install grid-connected solar PV on municipal facilities or land and complete public engagement for the project.
- **Residential and Commercial Solar Program**: Offers rebates to homeowners, businesses, and non-profits that install solar PV systems.
- ***Small Power Research and Development Act****:* This Act permitted nine pilot projects, including small-scale solar power plants, to sell electricity to public utilities under long-term contracts. Unfortunately, there is no funding left for the project.
- **HAT Smart Program**: A Solar Electric Panels Rebate which provided incentives to applicants who purchased or leased, and then installed, a certified solar electric system between January 1, 2017, and December 31, 2017.
- **Low-interest bank loans**: Banks offer certain loans specific to renewable projects. For example, the Royal Bank of Canada provides specific floating-rate term loans during the construction phase and financing options for equipment.
- **Alberta Investor Tax Credit**: A tax credit that encourages investment in non-traditional sectors with strong job creation potential, including renewable resource projects that meet the eligibility requirements.

WIND

In Alberta, the AUC and AEP are both responsible for regulating wind projects. Regulation occurs through both legislation and policy, including the AEP's Wildlife Directive for Wind Energy Projects.[137] Overall, wind projects follow the regulatory framework set out in the section "Regulatory Framework for Renewable Energy Projects in Alberta" above, although it is unclear whether the environmental assessment process under *EPEA* will be mandatory for future large-scale wind projects. At this point, the majority of wind projects have not undergone a formal environmental assessment prior to AUC approval.[138]

What is the current status of wind energy in Alberta?

In 1993, one of the first commercial wind farms in Canada was installed on Cowley Ridge in southern Alberta. The opening of this farm solidified Alberta's spot as the third largest wind market in Canada, falling behind only Quebec and Ontario.[139]

To encourage increased renewable energy generation, including wind turbines, and in order to add the 5,000 MW of renewable electricity generation to the Albertan grid by 2030 (as required by the Climate Leadership Plan), in 2017, the AESO put out calls for renewable energy companies interested in producing renewable electricity for the province. The criteria for the first round of competitions

[137] Wildlife Directive for Alberta Wind Energy Projects.

[138] Wildlife Directive for Alberta Wind Energy Projects.

[139] Canadian Wind Energy Association, "Wind Energy in Alberta" online: https://canwea.ca/wind-energy/alberta/; Alberta Culture and Tourism, "Alberta and Modern Wind Power" Government of Alberta online: http://www.history.alberta.ca/energyheritage/energy/wind-power/alberta-and-modern-wind-power.aspx.

required companies to: procure up to 400 MW of renewable electricity capacity; be operational by 2019; be equal to or greater than five MW; meet the Natural Resources Canada definition of renewable energy (which includes wind-generated power); and utilize the existing transmission and/or distribution systems.[140] This project also aimed to make renewable power cost-competitive with traditional sources of power by reinvesting a portion of revenues from the provincial carbon levy, which is not discussed at length in this report, but which is applied to GHG emitters, into the successful projects.[141] Significantly, all four of the first round picks were for wind projects (details of this competition can be found in the regulatory overview above).

What are some of the legal considerations specific to wind projects in Alberta?

Ongoing Regulatory Requirements

In addition to either the AUC approval process or the micro-generator approval process, there are also federal and provincial requirements specific to wind energy projects. These include approvals from Transportation Canada, NAV Canada, and Alberta Transportation.[142]

First, in order to receive Transportation Canada approval, a wind turbine project developer will need to submit an Aeronautical Obstruction Clearance Form which is done to ensure that there are no lightings and markings that could be a hazard to aviation/aeronautical safety and visibility to pilots.[143] Next, a project proponent will also need to receive an approval from Alberta Transportation which requires a Roadside Development Permit if the wind generator is within 300 metres of a numbered highway and/or 800 metres from the intersection of a numbered highway.[144] Finally, NAV Canada

[140] Alberta Electric System Operator, "Participate in the REP" (2016) Government of Alberta online: https://www.aeso.ca/market/renewable-electricity-program/first-competition/.

[141] Amanda Stephenson, "Alberta Wind Industry Praises NDP for Renewable Power Procurement", *The Calgary Herald* (3 November 2016) The Calgary Herald online: http://calgaryherald.com/business/local-business/alberta-wind-industry-praises-ndp-plan-for-renewable-power-procurement.

[142] Tim Weis et al, *Landowners' Guide to Wind Energy in Alberta* (2010) Pembina Institute at 76 online: https://www.pembina.org/reports/alberta-landowners-guide-web.pdf.

[143] Tim Weis at 77.

[144] Tim Weis at 77.

requires a Land Use Proposal which is designed to ensure that the wind turbine will not affect air navigation.[145]

Small Wind Projects

Wind turbines installed on urban or municipal buildings are generally subject to standard building code restrictions – including height restrictions. In order to circumvent these restrictions, in the event that a wind turbine is in contravention of a height restriction, individual turbine owners may be able to request a variance to certain provisions that exempt specific uses from these limits (e.g. church spires, silos and water towers). For example, in The Blue Mountains, Ontario, a by-law provision allows water-pumping windmills to exceed the regular height restrictions.[146] Recently, this by-law was amended to

[145] Tim Weis at 76.

[146] Heather Rhoads-Weaver et al., "Small Wind Siting and Zoning Study: Development of Siting Guidelines and a Model Zoning By-Law for Small Wind Turbines" Canadian Wind Energy Association (September 2006) at 5 online: http://www.toolkit.bc.ca/sites/default/files/Small_Wind_Siting_Bylaw%20and%20Guidelines.pdf [Rhoads-Weaver].

include wind turbines, permitting them to be mounted on the roofs of buildings.[147] In Medicine Hat, city by-laws also provide an exception to building height restrictions for wind turbines.[148]

Economic Opportunities

A report released by the Delphi Group in September 2017 looked at the Alberta Wind Energy Supply Chain Study and suggested that as much as 95% of the 30% renewable energy in Alberta, as proposed by the Climate Leadership Plan, could come from wind energy. The study also expanded upon this idea to find that if 95% of the renewable energy in Alberta was wind power, it would result in $3.6 billion in local spending and development, $137 million in local operations and maintenance and approximately 714 full-time jobs, all before 2030. The report also highlighted the ease with which Alberta will be able to switch from more traditional oil and gas jobs to wind, due to the highly skilled labour force that already exists in the province and the transferable nature of those specific skills. (The report is called the "Alberta Wind Energy Supply Chain Study" and was published online by the Canadian Wind Energy Association).

To help with this transition, Lethbridge College launched a Wind Turbine Technician program and both the Southern Alberta Institute of Technology (SAIT) and Northern Alberta Institute of Technology (NAIT) offer a diploma in Alternative Energy Technology which prepares students for careers in wind energy, along with other renewable energy sources. Meanwhile, the University of Alberta expects an increase of 1,000 students studying energy and environmental programs in the next four years.

Delphi Group, "Alberta Wind Energy Supply Chain Study" (September 2017) Canadian Wind Energy Association online: https://canwea.ca/wp-content/uploads/2017/09/Delphi-AB-Wind-Supply-Chain-Study-Final-Report.pdf.

[147] Rhoads-Weaver at 5.

[148] City of Medicine Hat, by-law No 4168, City of Medicine Hat Land Use By-law (2017) s 5.7(xi).

What are some of the risks to be aware of?

Wind Turbines and Impacts on Human Health

Since the increase in wind farm construction across Canada, certain physicians have reported increased complaints about adverse health effects affecting their patients, allegedly due to wind turbines.[149] These effects have been documented in areas with wind turbine concentration, such as Southern Ontario, where people live in close proximity to commercial wind turbines.[150] The alleged health effects include decreased quality of life, annoyance, stress, sleep disturbance, headaches, anxiety, depression, and cognitive dysfunction.[151]

In response to these anecdotal reports, the Ontario Ministry of Health published a study in 2010 in which they concluded that there was no direct causal link between infrasound (low frequency sound produced by wind turbines) and adverse health effects.[152] This conclusion was echoed by a 2015 survey conducted by the Council of Canadian Academics which stated that the only causal effect of wind

[149] Roy D. Jeffrey, "Adverse health effects of industrial wind turbines" (May 2013) 58:5 Can Fam Physician 473 [Roy D. Jeffrey].

[150] CBC News, "Wind turbines' effect on health to be studied by Ottawa" (10 July 2012) *CBC News* online: https://www.cbc.ca/news/politics/wind-turbines-effects-on-health-to-be-studied-by-ottawa-1.1161685.

[151] Roy D. Jeffrey.

[152] Chief Medical Officer of Health of Ontario, "The Potential Health Impact of Wind Turbines" (May 2010) Government of Ontario at 6 online: http://www.health.gov.on.ca/en/common/ministry/publications/reports/wind_turbine/wind_turbine.pdf.

turbine noise was annoyance.[153] Scientific consensus seems to be that there is not yet sufficient evidence to relate any negative health effects to wind turbines. Yet, this has not translated into a consensus in the public opinion, with several members of the public still citing wind turbines as the reason for their chronic illness.[154]

These reports have also been cited in numerous Ontario Environmental Review Tribunal decisions. The Ontario Environmental Review Tribunal's mandate includes consideration of the potential serious harm to human health, or serious or irreversible harm to plant life, animal life or the natural environment stemming from a wind turbine project and therefore will consider any potential adverse health effects brought up by project opponents.[155] However, despite this consideration, the Ontario Environmental Review Tribunal has concluded that, on the balance of probabilities, wind turbines do not cause serious harm to human health when they are located at a regulated setback distance and within acceptable noise emission levels.[156] The Ontario Superior Court of Justice has also considered the Health Canada Study specifically and found that all it suggested was that there was an association between wind turbine noise and annoyance.[157]

Potential Regulatory and Civil Liability

Liability may also need to be considered when landowners are deciding whether to agree to the construction or installation of a wind turbine lease or project. Any contract or lease agreement with a wind turbine developer should include an indemnity clause which would indemnify the landowner from accidents and damages resulting from the energy development during its entire life cycle, including

[153] Council of Canadian Academies, "Understanding the Evidence: Wind Turbine Noise" (2015) online: http://www.scienceadvice.ca/uploads/eng/assessments%20and%20publications%20and%20news%20releases/wind-turbine-noise/WindTurbineNoiseFullReportEn.pdf; CBC News, "Wind turbine noise linked to only 1 health issue – annoyance" (9 April 2015) online: http://www.cbc.ca/news/technology/wind-turbine-noise-linked-to-only-1-health-issue-annoyance-1.3025495; Health Canada, "Wind Turbine Noise and Health Study: Summary of Results" (30 October 2014) online: Government of Canada https://www.canada.ca/en/health-canada/services/environmental-workplace-health/noise/wind-turbine-noise/wind-turbine-noise-health-study-summary-results.html.

[154] Ann-Marie Macdonald, "Wind Rush", Episode: *CBC Doc-Zone* (16 May 2015) CBC News online: http://www.cbc.ca/doczone/episodes/wind-rush.

[155] *Concerned Citizens of North Stormont v Ontario (Environment, Conservation and Parks)*, 2018 CanLII 67718 (ON ERT) at para 24.

[156] *Dingeldein v Ontario (Environment and Climate Change)*, 2015 CanLII 51502 (ON ERT) at para 98.

[157] *Dixon v Director, Ministry of Environment*, 2014 ONSC 7404 at para 86.

construction and decommission. A landowner can also ask to be named as an additional insured on the insurance policy. This would mean that the insurance company would defend both the landowner and the developer in the case of an action against one.[158]

There are also certain liability concerns that come with ensuring site security, in part, because wind turbines may not always be surrounded by extensive fencing. Responding to these concerns could include making sure that the site is maintained and that members of the public cannot access the site or climb onto the wind turbine, risking injury. A proper indemnity clause would shift this liability to the developer. Notably, occupiers' liability may still apply and both the owner as well as the developer of a wind turbine should ensure the site is secure and that they have reviewed the *Occupiers' Liability Act.*[159]

The placement of wind turbines should also be sited with consideration for potential ice throws.[160] Ice throws occur when ice builds up around the wind turbine and can fall a relatively far distance from the turbine. This may become a liability if the turbine was found to have been constructed too close to the property line. The distance required to lower the risk of ice throws can be calculated because ice almost always falls within a distance from the turbine that is equal to the total turbine height.[161] If the blade is still moving when ice builds up, the ice may fall between 15 – 100 metres from the base of the turbine.[162]

Smart Siting

Smart siting is a technique designed to mitigate any bird and bat mortality associated with increased wind turbine construction, as well as, to prevent serious habitat disturbance, such as destruction of

[158] Farmers' Advocate Office at 5.

[159] *Occupiers' Liability Act*, RSA 2000, c O-4.

[160] Tim Weis, Alex Doukas & Kristi Anderson, *Landowners' Guide to Wind Energy in Alberta* (September 2010) The Pembina Institute at 32 online: https://www.pembina.org/reports/alberta-landowners-guide-wind.pdf [Weis, Doukas & Anderson].

[161] Weis, Doukas & Anderson at 32.

[162] Ellenbogen et al, "Wind Turbine Health Impact Study: Report of Independent Expert Panel" (January 2012) Massachusetts Department of Environmental Protection & Massachusetts Department of Public Health at 8-9 online: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

native prairie habitats.[163] Despite the widely differing opinions on how many birds and bats die each year due to wind turbines, smart siting is widely accepted as a means to limit future bird and bat mortality.[164] Smart siting ensures that wind turbines are not constructed in the middle of a migratory path or in a sensitive ecological zone.[165] The requirements for proper siting, as well as other wildlife mitigation techniques, are described in the Wildlife Directive for Wind Energy Projects, discussed in the regulatory section above.[166] Compliance with this directive is required prior to approval of a large-scale wind energy project and is an attempt to minimize negative effects on wildlife in the area of wind turbine development.

This may also be an area where the *MBCA, 1994* and *SARA* may be triggered.[167] Although these are both federal acts, they are triggered when migratory birds, including the populations or individuals of a species at risk, or their nests or homes may be threatened or affected by development – including renewable energy projects. One of the most vocal criticisms of wind turbines is the risk to birds and bats and when migratory birds are threatened, wind turbine developers will need to be aware of these acts.

[163] Nature Canada, "Wind Turbines: The Challenge" online: http://naturecanada.ca/initiatives/save-bird-lives/wind-turbines/ [Nature Canada].

[164] Nature Canada.

[165] Ottmar Edenhofer at 100.

[166] Wildlife Directive for Alberta Wind Energy Projects.

[167] *MBCA, 1994*; *SARA*.

Wind Energy Programs in Canada

- ***Small Power Research and Development Act**:* This Act enabled nine pilot projects, including small-scale wind power, to sell electricity to public utilities under long-term contracts. Although this was an incentive to increase wind turbine development, there is no funding left and the program has been suspended;

- **CanmetENERGY**: This is a federally funded group that encourages research in wind technology by providing financial support and technical expertise to partner groups such as the Wind Energy Institute of Canada (WEICan). Alberta has received some federal support from CanmetENERGY, the first of which was used for the Greengate Power Corp wind project in East-Central Alberta. This project was one of the last recipients of funding from the federal 'Ecoenergy for Renewable Power Program', which began in 2007. No new contribution agreements under this program have been signed since March 31, 2011, but any projects that received funding before this cut-off date receive a 1% per kilowatt per hour incentive for eligible production during their first ten years of operation;

- **The Wind Energy Institute of Canada** (WEICan): A wind research program focusing on technical testing & consultation; research, development & demonstration; and outreach. WEICan also has connections to the University of Calgary's wind energy engineering program, as well as, other governmental organizations; and

- **Post-Secondary Programs**: In anticipation of all of these changes, Lethbridge College, among other post-secondary institutions, began offering courses for wind turbine maintenance and installation, thereby allowing workers to re-train and to increase job opportunities in the renewable energy sector.

GEOTHERMAL

Geothermal energy is not reliant upon intermittent energy sources such as wind and sunlight. This means that it has the potential to produce power 24 hours a day, seven days a week. The United States Energy Information Administration even lists geothermal as having the highest capacity factor (which means the most competitive rates) higher even than coal and natural gas, as well as other renewable energy sources.

Geothermal energy is heat energy generated and stored in the Earth's crust. Through a well and using heat-conveying fluid, pumps move this heat up from under the ground to a generator, to create heat or electricity through the generation of steam.[168] Important for our purposes, geothermal is renewable, it can use existing energy infrastructure (including oil wells) and it is a baseline power which means that it is not weather-dependent like solar or wind power.[169] It is well-suited to Alberta due to our extensive knowledge of the underground substrate, mapped out by the oil and gas industry. Alberta also has an abundance of geologists, engineers, drillers, and other oil patch workers that have skills easily transferable from oil and gas, to geothermal.

A study done by the Canadian Geothermal Energy Association (CanGEA) and Fuzeium resulted in an interactive dashboard illustrating geothermal potential across Alberta.[170] These potential sites are divided into three types of geothermal energy: power generation (>120c) of which there are about 500 potential well sites; industrial heat (>90c) of which there are about 7,200 potential well sites; and direct heat (>60c) of which there are about 53,000 potential well sites.[171]

[168] United States Environmental Protection Agency, "Geothermal Heating and Cooling Technologies" United States Government online: https://www.epa.gov/rhc/geothermal-heating-and-cooling-technologies.

[169] John Hopkins-Hill, "Geothermal study final report received by council" *The Hinton Parklander* (24 May 2017) online: http://www.hintonparklander.com/2017/05/24/geothermal-study-final-report-received-by-council.

[170] Fuzeium, "Alberta's Geothermal Potential" online: https://fuzeium.com/geothermal-co-production-study/?report=0 [Fuzeium].

[171] Fuzeium.

Along with its abundance, geothermal is also a relatively competitive renewable resource.[172] This is, in large part, due to the fact that it is not reliant upon intermittent energy sources such as wind and sunlight. This means that it has the potential to produce power 24 hours a day, seven days a week. The United States Energy Information Administration lists geothermal as having the highest capacity factor (which means the most competitive rates) higher even than coal and natural gas, as well as, other renewable energy sources.[173]

Currently, there are no active commercial geothermal locations in Canada and even with our substantial geothermal potential, we lag behind other countries such as Iceland[174] and New Zealand[175] or states like California.[176] Fortunately, there are now three proposed sites in the works – in Saskatchewan, British Columbia, and Alberta.

How is geothermal regulated?

'Thermal' power generation is included in both the Schedule of Activities at the end of *EPEA* as well as in the *Activities Designation Regulation*, under the definition of a power plant, however, geothermal specifically, remains relatively unregulated in Alberta.[177]

Despite this large gap in regulation, existing legislative provisions likely mean that geothermal projects, if defined as 'thermal' power generation, could trigger the requirement for a full environmental assessment. Although, as previously noted, there is not yet any large-scale geothermal in Alberta and the process for approval process for these projects has not yet been fully established. Due to this lack of regulation, it is also unclear whether geothermal for electricity generation and geothermal for heat generation will be defined differently and will therefore be regulated differently. Notably, the *Activities*

[172] Benjamin Matek, "The Manageable Risks of Convention Hydrothermal Geothermal Power Systems: A Factbook on Geothermal Power's Risks and Methods to Mitigate Them" (February 2014) Geothermal Energy Association at 5 online: http://geo-energy.org/reports/Geothermal%20Risks_Publication_2_4_2014.pdf [Benjamin Matek].

[173] Benjamin Matek at 5.

[174] Orkustofnun National Energy Authority, "Geothermal" Government of Iceland online: https://nea.is/geothermal/.

[175] New Zealand Geothermal Association, "NZ Geothermal Fields" online: https://nzgeothermal.org.nz/nz_geo_fields/.

[176] California Energy Commission, "California Geothermal Energy Statistics & Data" (2019) *Government of California* online: https://www.energy.ca.gov/almanac/renewables_data/geothermal/.

[177] *EPEA*, Sched s 2(n); *Activities Designation Regulation*, s 2(1) (vv).

Designation Regulation's definition of 'power plant' is a plant that produces steam or thermal electrical power.[178]

To understand some of the challenges that arise when attempting to legislate geothermal, the first question that needs to be clearly answered is – how do we legally define geothermal - is it water or is it a mineral? The second question is then, how do we own heat and if it can be owned, who would be the owner – the owner of the water or the owner of the minerals? Currently, Alberta does not have a regulatory system for the ownership of heat. This is not unique to Alberta and despite becoming more common across the globe, there is no consensus on how to define geothermal resources either between countries, or within them.[179]

Due to the extensive oil and gas network in Alberta, it may be easiest to incorporate geothermal under the umbrella of the Alberta Energy Regulator, the Regulator with the most familiarity with drilling processes. For example, the *Mines and Minerals Act* could be amended to include geothermal in subsection 1(1)(p)(i) which currently defines the term 'minerals', with no reference to geothermal.[180] However, regardless of whether Alberta decides to define geothermal as water or as a mineral, the regulatory process must be clear and streamlined, while taking into account regulatory decisions made by neighbouring provinces.[181]

It is well established that the provinces, including Alberta, have jurisdictional control over natural resources.[182] However, should geothermal be defined as 'water' and a geothermal aquifer cross interprovincial or international borders, it could trigger federal involvement. This is due to the fact that

[178] *Activities Designation Regulation*, s 2(1) (vv).

[179] Ingimar G. Haraldsson*, Legal and Regulatory Framework – Barrier or Motivation for Geothermal Development?* (March 2012) United Nations University Geothermal Training Programme at 1 online: http://www.os.is/gogn/unu-gtp-sc/UNU-GTP-SC-14-17.pdf.

[180] *Mines and Minerals Act*, RSA 2000, c M-17.

[181] Peggy Holroyd & Jennifer Daff, "Building a regulatory framework for geothermal energy development in the NWT: A report for the Government of Northwest Territories, Environment and Natural Resources Department" (March 2011) Pembina Institute at 39 online: http://www.enr.gov.nt.ca/sites/enr/files/building_a_regulatory_framework_for_geothermal_in_the_nwt.pdf.

[182] *Constitution Act, 1982,* being Schedule B to the *Canada Act, 1982* (UK), 1982, c 11, s 92A.

the Federal Government has jurisdiction over both transboundary waters and international treaties.[183] These decisions could also impact whether or not *Water Act*[184] approvals or licences are needed prior to receiving approval for geothermal power plants.

The following section will make the assumption that geothermal has been defined as a mineral, rather than as water and will rely on this assumption to underscore some of the ways geothermal can be incorporated into new or existing Alberta legislation.

First, the *Mines and Minerals Act* gives the Lieutenant Governor in Council the power to make regulations respecting everything from the exploration for, and development of, minerals, to the payment of royalties.[185] This power could be extended to regulate geothermal without the need for a dedicated statute.[186]

Another option would be to incorporate geothermal into either the existing *Metallic and Industrial Minerals Tenure Regulation*[187] or the *Petroleum and Natural Gas Tenure Regulation*,[188] (both of which were created under the auspices of the *Mines and Minerals Act*). The *Metallic and Industrial Minerals Tenure Regulation* would govern geothermal under a mineral tenure system and could be enabled by the broad definition of 'mineral' in the *Mines and Minerals Act*.[189]

In contrast, the *Petroleum and Natural Gas Tenure Regulation* would govern geothermal tenure as it does for petroleum and natural gas.[190] This would be a relatively easy accommodation because petroleum, natural gas, and geothermal all use similar extraction methods, especially in comparison to the extraction of metallic and industrial minerals. However, adding geothermal to this regulation would require an amendment to Part 4 of the *Mines and Minerals Act*, the part of the Act which currently

[183] Grant Van Hal, "Legal Obstacles to the Development of Geothermal Energy in Alberta" (December 2013) Canadian Institute of Resources Law Occasional Paper #42 at 20 online: https://dspace.ucalgary.ca/bitstream/id/39528/GeothermalOP42w.pdf/ [Grant Van Hal].

[184] *Water Act*.

[185] *Mines and Minerals Act*, s 5.

[186] Grant Van Hal at 27.

[187] *Metallic and Industrial Minerals Tenure Regulation*, Alta Reg 145/2005 [*Metallic and Industrial Minerals Tenure Regulation*].

[188] *Petroleum and Natural Gas Tenure Regulation*, Alta Reg 263/1997 [*Petroleum and Natural Gas Tenure Regulation*].

[189] *Metallic and Industrial Minerals Tenure Regulation*.

[190] *Petroleum and Natural Gas Tenure Regulation*.

defines natural gas and petroleum.[191] A third option would be to create a new geothermal-specific regulation.

Geothermal development would then be governed by the Alberta Energy Regulator and all approvals and permits would need to first be approved by the Regulator.

In the event that geothermal is not considered a mineral but rather is defined as water, or that it otherwise falls under the control of the *Hydro and Electric Energy Act*,[192] the regulatory process would be governed by the AUC and AEP and would follow the same regulatory process as the other forms of renewable energy power sources, described in the section "Regulatory Framework for Renewable Energy in Alberta" above.

The 2017 Federal Budget

The 2017 federal budget expanded upon previous tax breaks and incentives available to geothermal projects in an important way.[193] Before these changes, tax credits differentiated between geothermal equipment primarily used for producing electricity, which was eligible for an accelerated capital cost allowance (CCA) rate of 50%, and geothermal equipment primarily used for producing heat, which was only eligible for a CCA rate of 4%.[194] This meant that to be eligible for an accelerated capital cost allowance and to qualify as a 'renewable energy source' all production had to be allocated for electricity generation – limiting which wells could be eligible.[195] The new budget expanded the list of eligible thermal energy equipment for the 30% or 50% CCA to include geothermal equipment primarily for generating heat, or for generating a combination of heat and electricity.[196]

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[191] Grant Van Hal at 20.

[192] *Hydro and Electric Energy Act*.

[193] Drew Anderson, "Alberta geothermal industry celebrates federal budget but challenges remain" *CBC News* (24 March 2017) online: http://www.cbc.ca/news/canada/calgary/alberta-geothermal-tax-incentives-federal-budget-challenges-1.4039677.

[194] Alex Kent, "What the Federal Budget Means for Geothermal – a Brief Explanation" (31 March 2017) Canadian Geothermal Energy Association online: https://www.cangea.ca/news-blog/what-the-federal-budget-means-for-geothermal-a-brief-explanation [Kent].

[195] Kent.

[196] Osler, "Federal Budget Briefing 2017" (22 March 2017) online: https://www.osler.com/en/resources/regulations/2017/federal-budget-briefing-2017 [Osler].

The 2017 budget also proposed measures aimed at promoting investment in geothermal technology. One new measure was the expansion of the eligible costs of property included in a CCA class.[197] This class was expanded to include the cost of completing a geothermal well and the cost of related electricity transaction equipment, if the system produces electricity. This made geothermal heat an eligible thermal energy source in district energy systems and expanded renewable and conservation expenses to include any expenses that might be incurred during the process of determining the extent and quality of a geothermal resource and/or the cost of geothermal drilling.[198] These changes make geothermal exploration more affordable and less risky which leads to more investment and consequently more geothermal projects getting off the ground and finding viable well locations.

What are some of the risks to be aware of?

Orphaned and Abandoned Wells and Liability

One of the issues associated with converting orphaned or abandoned oil and gas wells into functioning geothermal wells, which has been touted as a way to increase geothermal energy production in Alberta, is how and where liability will be transferred.[199] Abandoned wells, particularly suspended wells that have not yet been sealed, may be easier to transfer to geothermal because there is still a company responsible for them.[200] In the case of an abandoned well, the oil and gas company that operated that well would have the option of converting the well to geothermal and maintaining their ownership and liability over the same.

In contrast, because an orphan well is a well that does not have anyone legally responsible for it, this also means that there may be no one liable. This is why, when a well is declared orphaned, the Orphan Well Association, under the auspices of the Alberta Energy Regulator steps in to take over.[201] Currently, there is no system in place to encourage oil and gas producers to transfer end-of-life wells to

[197] Osler.

[198] Osler.

[199] Marius Roksland, Tommy A. Basmoen & Dan Sui, "Goethermal energy extraction from abandoned wells" (2017) 105 Energy Procedia 244; Geoffrey Morgan, "Putting Alberta's idle wells to work could heat up the energy patch" *Financial Post* (20 October 2016) online: https://business.financialpost.com/commodities/energy/putting-albertas-idle-wells-to-work-could-heat-up-the-energy-patch.

[200] Alberta Energy Regulator, "Suspension and Abandonment" online: https://www.aer.ca/regulating-development/project-closure/suspension-and-abandonment.

[201] Alberta Energy Regulator, "Orphan Energy Sites" online: https://www.aer.ca/protecting-what-matters/protecting-the-environment/orphan-energy-sites.

geothermal producers and to encourage geothermal developers to safely take on this liability. This would also likely require a method of transferring environmental liability from the oil and gas producer to the geothermal developer.

Other liability issues may arise with increased geothermal production including occupiers' liability and a host of environmental risks to be considered from general safety issues, subsurface concerns, water use, and other related impacts due to surface impacts.

Economic Constraints

The majority of costs associated with geothermal technology are up-front costs, incurred primarily during the exploration and drilling phases, which is also where most of the project risk is undertaken. In the long run, geothermal is an economically competitive renewable energy source, however, setting up geothermal technology is more expensive and riskier than other renewable energy projects, such as solar or wind power. It is also more difficult to test for geothermal, and drilling projects that set out to find a good geothermal source may not be successful. (See Benjamin Matek at page 5).

Government subsidies at the initial stages of geothermal development may help to encourage more research because they can help to lower the risks associated with geothermal exploration. The size and shape of a geothermal plant can significantly affect the quantity and quality of the underground resource. (Matek at 5) Accordingly, substantial research and exploration is necessary beforehand, and the data collected must be both the correct type and come with high quality results. Additionally, even though extensive research will help to determine where the best location for geothermal is, the true quality of the resource will be unknown until drilling is completed. This means that until the well is completed, there is always a risk of low quality geothermal and a potentially wasted investment.

BIOENERGY

Bioenergy is usually found in two main forms: (1) biogas which converts manure, feed spills, crop residues, slaughter waste and other organic wastes into methane to generate heat and power; and (2) biomass which includes facilities that combust waste wood from forest products and agriculture crop waste to produce heat and power.

Bioenergy is energy produced from biological materials in solid, liquid or gaseous form that have stored sunlight in the form of chemical energy.[202] It does not, however, include those organic materials that have been transformed over long periods of time by geological processes into substances such as coal or petroleum. Natural Resources Canada states that "bioenergy can be burned directly to produce heat and/or electricity and it can be converted biochemically, catalytically or thermally to produce liquid fuels."[203] It can also produce gaseous fuel, oils, and high value chemicals – although this primer will not focus on the production of biofuels.

Bioenergy is usually found in two main forms: (1) biogas which converts manure, feed spills, crop residues, slaughter waste and other organic wastes into methane to generate heat and power; and (2) biomass which includes facilities that combust waste wood from forest products and agriculture crop waste to produce heat and power.[204] Wood biomass can be combusted to produce heat for industrial purposes, for space and water heating, or to produce steam for electricity and is a fast growing area of renewable energy.[205]

[202] Natural Resources Canada, "About Renewable Energy".

[203] Energy Sources and Distribution, "Biomass Resources" (27 July 2017) Government of Canada online: http://www.nrcan.gc.ca/energy/renewable-electricity/bioenergy-systems/7389.

[204] Pembina Institute, "Community-Owned Renewable energy: Making Renewable Energy a Priority" online: https://www.pembina.org/reports/community-owned-re-fact-sheet.pdf.

[205] Natural Resources Canada, "About Renewable Energy".

Bioenergy is one of the largest renewable energy sources in Canada, making up 1.4% of Canada's electricity generation in 2016. Yet, it does not have a significant presence in Alberta. [206]

How is bioenergy regulated in Alberta?

The two main regulators for bioenergy projects in Alberta are the AUC and AEP, with final approvals granted by the AUC according to the *Hydro and Electric Energy Act*.[207] Thus, the general regulatory process applicable to bioenergy projects can be found in the section "Regulatory Framework for Renewable Energy in Alberta", above.

In addition to this regulatory process, bioenergy projects may also require an environmental assessment. This process would be triggered if a bioenergy project was found to fall under the definition of 'power plant' found in the *EPEA* regulations. A power plant is defined as, "a plant that produces steam or thermal electrical power and has a rated production output of greater than one MW under peak load, but does not include (i) a production facility for space heating, or (ii) a system at a sawmill plant that is designed to burn wood waste and recover the heat of the combustion, where the system (a) has a rated production output of no more than 10 MW of electricity of its steam equivalent under peak load, and (b) uses only wood waste generated at that sawmill plant as fuel."[208] Currently, however, many of the existing bioenergy projects are small and designed to use a facility's waste for energy production and therefore would not trigger an environmental assessment.

Specific to bioenergy may also be the increased need for air quality indicators. Although bioenergy is a renewable energy, it does have the potential to release biogas either through venting or as an accidental release.[209] The AUC and AEP may require modelling and testing be done prior to approval to ensure that the project and any potential emissions comply with the *Alberta Ambient Air Quality Objectives,*[210] the guidelines for air quality in the province, developed under *EPEA*. During the approval

[206] Ottmar Edenhofer at 19.

[207] *Hydro and Electric Energy Act*.

[208] *Activities Designation Regulation*, s 2(vv).

[209] Millar Western Forest Products Ltd. – Biogas Power Plant at 6 & 9.

[210] Alberta Environment and Parks, "Alberta Ambient Air Quality Objectives and Guidelines Summary" (30 July 2017) Government of Alberta online: http://aep.alberta.ca/air/legislation-and-policy/ambient-air-quality-objectives/documents/AAQO-Summary-Jun29-2017.pdf.

process, the AUC can require that the proponent demonstrate any modelling done on potential air emissions and outline any mitigation steps that were taken to prevent or minimize harmful emissions.[211]

What are some of the legal considerations specific to the incorporation of bioenergy in Alberta?

Zoning for Bioenergy Plantations

One way to generate bioenergy is through the conversion of forests or peatlands into bioenergy products. This is a relatively simple method, taking plants and burning them for fuel, however, it has certain harmful effects including a delayed emissions reduction and harm to biodiversity. The delay in emissions reductions occurs because when processed, any of the CO_2 stored in these plants is released into the atmosphere, usually occurring before replacement plants have been planted and are large enough to provide the same level of carbon uptake.[212] In turn, the harm to biodiversity occurs when virgin forests or peatlands are destroyed to make way for bioenergy. Additionally, the conversion of forests and peatlands inevitably involves more deforestation or destruction of high-quality forests and wetlands and therefore less absorption of CO_2.[213]

Bioenergy plantations may be one option to avoid any collateral damage to biodiversity or increased deforestation. These plantations would be made up of crops planted on degraded soils, avoiding further deforestation and absorbing CO_2 while the plantations are growing which would also allow for increased carbon uptake. The ability to create these plantations would require zoning changes to be made by both municipalities and the province, allowing for bioenergy plantations on land that has been degraded by inappropriate agricultural techniques or other industrial activity.[214]

[211] Millar Western Forest Products Ltd. – Biogas Power Plant at 6 & 9.

[212] Natural Resources Defense Council & Dogwood Alliance, "Smokescreen for Forest Destruction and Corporate Non-Accountability" (May 2015) at 3 online: https://www.dogwoodalliance.org/wp-content/uploads/2017/06/Sustainable-Biomass-Program-Report.pdf [NRDC & Dogwood Alliance].

[213] William H. L. Stafford & Alan Brent, *Systems Sustainability Assessment and Management*, 2 Renewable Energy L & Pol'y Rev 205 (2011) at 212; NRDC & Dogwood Alliance.

[214] Ottmar Edenhofer at 51.

Additionally, biofuel production can utilize plants grown in saline soil or brackish water which may be a good way to utilize previously polluted landscapes, thereby cutting down on any increase in land being used for energy production.[215]

Use of Existing Industries: Farming and Forestry

Currently, much of the biomass in Canada is generated from industrial wood waste and particularly the waste generated by pulp and paper mills. This means that forestry is one of the most viable industries for the expansion of sustainable biomass production. In fact, according to Natural Resources Canada's page "About Renewable Energy", by 2014, biomass made up nearly 50% of the energy used in the forestry industry across Canada.

Agriculture and animal farming are also large industries in Alberta and have been for decades. This abundance of farm by-products may also encourage bioenergy production because agricultural residues and organic wastes can provide fuel for bioenergy projects and in doing so, reduce any potential GHG emissions from the project itself. This could allow for increased use of renewable energy with little economic or social impact.

What are some of the environmental risks?

Impacts on Biodiversity due to Bioenergy Monocrops

The use of bioenergy plantations may help to prevent further deforestation or the destruction of high quality wetlands or forests. However, this technique is also not without risk. There is risk in developing large-scale monocultures at the expense of natural areas with high ecological value, a risk that was highlighted on a large-scale in the United Nation's 2007 *Convention on Biological Diversity*.[216]

[215] Ottmar Edenhofer at 54.

[216] *United Nations Convention on Biological Diversity*, 29 December 1993, 1760 UNTS 79.

In order to avoid this risk, bioenergy plantations must incorporate different plants including perennial grasses and woody crops which also have myriad positive effects including increased soil carbon and productivity, reducing shallow landslides and flash floods, providing ecological corridors, reducing wind and water erosion and reducing sediment and nutrients ending up in river systems. [217] A well designed forest biomass harvest also has the opportunity to improve conditions for replanting, improve productivity and growth of the remaining stand, and reduce wildfire risk.[218]

An IPCC report specified that land conversion and forest management that lead to a large loss of carbon stocks can lessen, and in some cases more than neutralize, the net positive GHG mitigation impacts.[219] Therefore, to be effective and environmentally friendly, bioenergy plantations need to be diverse, well-planned and situated in areas with previously low ecological value.

Water Scarcity

Water use may also pose a challenge for the development of bioenergy resources. Expansion of irrigated agriculture in closed basins across Alberta is consigned to existing licence or groundwater extraction. Where bioenergy results in higher consumptive use of a licenced allocation, environmental risks increase. The IPCC has stated that improvements can be made to water use efficiency in bioenergy crops.[220] These improvements rely on proper siting for climate factors as well as the use of perennial cropping systems which can improve water retention in the soil and lower evaporation, thereby using less water to generate the same amount of bioenergy.[221]

[217] Ottmar Edenhofer at 52.
[218] Ottmar Edenhofer at 52.
[219] Ottmar Edenhofer at 58.
[220] Ottmar Edenhofer at 58.
[221] Ottmar Edenhofer at 52.

Bioenergy Programs in Alberta

In December 2017, the Pembina Institute released a "New Energy Map" showcasing clean energy projects in Alberta. It has since been updated and highlights some of the clean energy projects that have been initiated between 2012 and 2018. In particular, the New Energy Map includes several bioenergy projects in operation across the province, including:

- **Power Wood Canada Corporation**: This project consists of a biomass-fueled power plant in La Crete. This plant is designed to reduce emissions through the use of forest harvest waste as fuel, rather than fossil fuels, and reduce waste by utilizing wood waste that would have otherwise ended up in a landfill;
- **High Solids Anaerobic Digestion Facility**: This facility is located at the Edmonton Waste Management Centre and is designed to generate renewable energy from biogas produced through organic waste;
- **Enerkem Alberta Biofuels**: This facility diverts household waste from landfills into clean biofuels and green chemicals;
- **Clover Bar Landfill Gas Project**: This is also located at the Edmonton Waste Management Centre and produces enough energy to power approximately 4,600 homes each year by creating methane gas through the decomposition of organic material;
- **SBI Bioenergy Inc.**: This company is working on environmental-friendly "drop-in fuels" which are designed as environmentally friendly replacements for diesel, gasoline and jet fuel;
- **Slave Lake Pulp Mill**: The mill constructed an energy plant that uses the mill's effluent, in the form of wastewater, to produce energy. This energy is then used by the mill to reduce its reliance on carbon-based electricity;
- **Biomass Demonstration Project in Sherwood Park**: This project uses agriculture residue and wood waste to help fuel the energy system originally built to accommodate fuel switching;
- **Lethbridge Biogas Project**: A biogas/cogeneration plant that processes organic residue and food processing by-products into energy, which is then used for electricity on the Alberta grid;
- **Southern Albertan Farm**: This farm installed a 633 KW anaerobic digester to generate electricity from methane; and
- **Whitecourt Pulp and Paper Mill**: The mill built a 25 MW biomass-fired power plant set up to use wood waste to produce energy for the mill's other processes.

HYDROELECTRICITY

Hydroelectric power is the most established form of renewable energy in Alberta, although today, it is waning in popularity due to increased costs and adversity against the associated environmental issues.

In Alberta, there are two major types of hydroelectric projects, reservoir and run-of-river hydro.[222] Reservoir hydroelectric projects use a dam to store river water in a reservoir. This water can then be released into a generator to meet changing electricity demands.[223] In contrast, run-of-river projects channel a portion of a river through a generator, while allowing the river to remain relatively free-flowing.[224] Each form comes with its unique challenges. For example, reservoirs have significant environmental impacts while run-of-river projects are characterized by having less power generation capacity, more limited ability to meet base and peak loads and are at the mercy of the river's flow.[225]

[222] National Energy Board, "Canada's Adoption of Renewable Power Sources – Energy Market Analysis".

[223] Office of Energy Efficiency & Renewable Energy, "Types of Hydropower Plants" United States Department of Energy online: https://www.energy.gov/eere/water/types-hydropower-plants [Office of Energy Efficiency & Renewable Energy, "Types of Hydropower Plants"].

[224] Office of Energy Efficiency & Renewable Energy, "Types of Hydropower Plants".

[225] David Dodge & Duncan Kinney, "Run-of-river pumps out enough electricity to power the Whistler Blackcomb resort" *Green Energy Futures* (8 February 2013) online: http://www.greenenergyfutures.ca/episode/30-how-it-works-run-river-hydro-electric-power.

How are hydroelectric projects regulated?

The majority of hydroelectric power projects require approval from the AUC, pursuant to the *Hydro and Electric Energy Act*.[226] Hydroelectric power projects are also regulated under the *EPEA*.[227]

According to the *EPEA*, a provincial environmental assessment of a hydroelectric projects is triggered for the construction or operation of dams greater than 15 metres in height, water diversion structures and canals, water reservoirs, or hydroelectric power plants generating 100 MW or more.[228] Projects that don't meet these criteria may also have to undergo an environmental assessment, in the event that the Director decides one is warranted.[229]

The *Water Act* is also triggered by hydroelectric power projects. Dams and run-of-river projects will require licenses for the diversion of water and the operation of works.[230]

Hydroelectric projects are governed by federal legislation, including the *Navigation Protection Act*,[231] the *MBCA, 1994*,[232] *CEAA, 2012*,[233] and the *Fisheries Act*.[234] At the time of writing, two major environmental bills had been passed by the House of Commons, and were in the process of working their way through the Senate - Bill C-68 amending the *Fisheries Act* and Bill C-69 replacing the *CEAA, 2012* and the *National Energy Board Act* and amending the *Navigation Protection Act.*[235] If passed,

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[226] *Hydro and Electric Energy Act*.

[227] *EPEA*, Schedule of Activities ss 1(o) & 9(1).

[228] *Environmental Assessment (Mandatory and Exempted Activities) Regulation*, Sched 1 ss (c), (d), (e) & (l).

[229] *EPEA*, ss 43-47.

[230] "Works" are defined by the *Water Act* to include "any structure, device or contrivance made by persons, or part of it, including a dam and canal…" at s.1(1(mmm)) In addition to the regulatory process for a power plant, the *Natural Resources Conservation Board Act* is the Act that regulates large-scale non-energy natural resource projects and that is responsible for approving "water management projects". Although this Act would not apply to projects designed for the purpose of generating renewable energy, it is worth being aware of in the event that a water management or water diversion project is converted, to, or from, a hydroelectric project. This change in status may require an approval by the Natural Resources Conservation Board.

[231] *Navigation Protection Act*.

[232] *MBCA, 1994*.

[233] *CEAA, 2012*.

[234] *Fisheries Act*.

[235] Bill C-68, *An Act to amend the Fisheries Act and other Acts in consequence*, 1st Sess, 42nd Parl, 2018, cl 3 (as passed by the House of Commons 20 June 2018) [Bill C-68]; Bill C-69.

these Bills will likely result in certain changes to the federal environmental assessment process and may impact whether or not other bills will be triggered by future hydroelectric projects.

First, on the federal level, federal environmental assessments may be required for hydroelectric projects according to both *CEAA, 2012* and the proposed *Impact Assessment Act* (Bill C-69). Under *CEAA, 2012*, those physical activities listed under the *Regulations Designating Physical Activities* are required to undergo an environmental assessment.[236] This regulation currently governs hydroelectric generating facilities with a minimum production capacity of 200MW; new dams or dykes that would result in the creation of a reservoir of 1,500 ha or more; the expansion of an existing dam or dyke to be 1,500 ha or more; the construction, operation or decommissioning of a new structure for the diversion of 10,000,000 m^3/year; and the expansion of an existing structure for the diversion of water from a natural body of water into another natural body of water.[237]

Second, the current *Navigation Protection Act* outlines the Federal Government's constitutionally protected power over navigation of waterways and authorizes the government to legislate with respect to all navigable waters and works of navigation.[238] Federal authorization is required for a "work" under the *Navigation Protection Act* in navigable water that is listed in the schedule to the Act.[239] A work is defined to "include any structure, device or thing, whether temporary or permanent, that is made by humans. It also includes the dumping of fill or the excavation of materials from the bed of any navigable water."[240] Where the work occurs in a navigable water that is not in the schedule to the Act, a common law right to navigation may still exist and this in turn may result in litigation of hydroelectric projects.[241] This means that despite provincial control over water management, the Federal Government retains constitutional authority over navigation.

Thirdly, where a hydroelectric project impacts on fisheries or fish habitat, *Fisheries Act* authorizations will also be required.[242] The current *Fisheries Act* prohibits serious harm to fish that are part of a

[236] Regulations Designating Physical Activities, SOR 2012/147 [*Regulations Designating Physical Activities*].

[237] *Regulations Designating Physical Activities*, schedule (b) & (c) ss 3(a), (b), 4, 5, 6, & 7.

[238] *Navigation Protection Act*, R.S.C., 1985, c. N-22 [*Navigation Protection Act*].

[239] *Navigation Protection Act*, s 3.

[240] *Navigation Protection Act*, s 2.

[241] To address this issue s. 4 of the Act has an "opt in" clause where a proponent can seek to have the Act apply to its waterway even though it is not in the schedule. An authorization under the Act is a valid infringement of the public common law right to navigation. See *Friends of the Oldman River v Canada (Minister of Transport)*, [1992] 1 SCR 3.

[242] *Fisheries Act*.

commercial, recreational, or Aboriginal fishery.[243] Serious harm includes permanent alteration or destruction of fish habitat.[244] Serious harm to fish can occur through various forms of authorization or regulations.[245] The Federal Government also regulates fish-ways and fish passage and can require that hydroelectric project proponents ensure there is a sufficient flow of water to enable fish passage through the dams.[246] This may not necessarily halt a project but could require further mitigation action before approval is granted.[247]

Notably, the proposed Bill C-68 plans to reinstate the HADD provision, which would expand Section 35 of the Act to prohibit the harmful alteration, disruption, or destruction of fish habitat, lowering the bar for harm and potentially increasing the Act's reach over hydroelectric projects.[248]

Fourthly, the *MBCA, 1994* and *SARA* legislate protection for migratory birds and species at risk. The *MBCA, 1994* is the federal Act that enshrines protection for migratory birds, their eggs and nests.[249] In the event that a federal environmental assessment is required and it is found that a hydroelectric project will interfere with migratory birds or their habitat, mitigation according to the *MBCA, 1994* is likely to be required.[250] Similarly, the *SARA* protects species at risk, including migratory birds and aquatic species as well as species at risk that live on federal land.[251] Once a species is designated as 'at risk' and the process for a recovery strategy is triggered, the species' critical habitat is identified and protections can be put in place. Although the *SARA* applies only on federal lands, hydroelectric projects that infringe upon federal land and these species may trigger this Act.[252] In addition, the Act also enables the federal government to extend protections to species otherwise under provincial control and if an order of this type is passed, hydroelectric projects that infringe upon critical habitat of a

[243] *Fisheries Act*, s 35.

[244] *Fisheries Act*, s 2(2).

[245] *Fisheries Act*, ss 35(1) & (2).

[246] *Fisheries Act*, ss 20 & 29.

[247] *Fisheries Act*, ss 20-21.

[248] Bill C-68, s 22(1); Brenda Heelan Powell, "Back to what we once HAAD (plus more)" (8 February 2018) Environmental Law Centre online: http://elc.ab.ca/back-hadd-plus/.

[249] *MBCA, 1994.*

[250] *MBCA, 1994*.

[251] *SARA.*

[252] *SARA*.

protected species may be impacted, regardless of whether they are found on provincial or federal lands.[253]

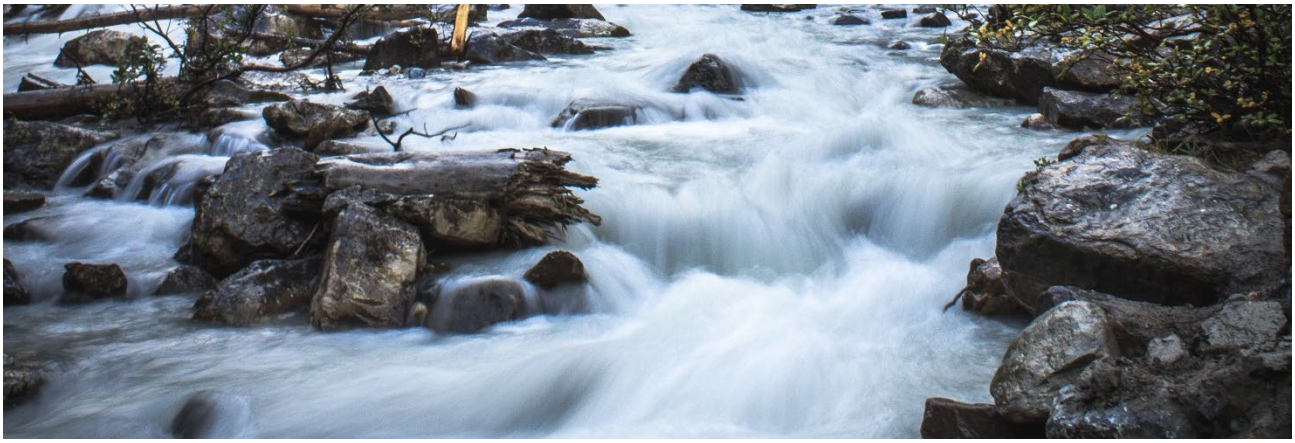
Recent Hydroelectric Power Applications in Alberta:

Amisk Hydroelectric Project: This project proposed by AHP Development Corporation is set to be built on the Peace River in northwestern Alberta and would generate 1,875 GW hours of electricity per year. It is a run-of-river project with a generating capacity of 370 MW. In February 2016, the Canadian Environmental Assessment Agency referred the assessment process to an independent agency and the project proponent has now indicated that they plan to submit their Environmental Impact Assessment report by 2020.

Pelican Renewable Generating Station Project: This project proposed the construction of a run-of-river hydroelectric facility on the Athabasca River, upstream of Fort McMurray. The proposed project included a generating capacity of 135 MW and a number of other components. However, in February of 2018 the Canadian Environmental Assessment Agency terminated the environmental assessment process, at the request of Pelican RGS GP Inc., the project proponent. The same occurred to another project proposed by the same parent company Innergex, the Sundog Renewable Generating Station Project which was also terminated during the application phase, in February of 2018.

Canadian Environmental Assessment Registry, "Amisk Hydroelectric Project" (12 December 2017) Government of Canada online: http://www.ceaa-acee.gc.ca/050/evaluations/proj/80112 [Canadian Environmental Assessment Registry, Amisk Hydroelectric Project]; AHP Development Corporation, "Amisk Hydroelectric Project – Project Update Spring 2017" (2017) online: http://nebula.wsimg.com/4554fe48c03b6d56744d6232776051cc?AccessKeyId=3AE63B7BFE2CDEDB204E&disposition=0&alloworigin=1; Canadian Environmental Assessment Registry, "Pelican Renewable Generating Station Project" (14 February 2018) Government of Canada online: http://www.ceaa-acee.gc.ca/050/evaluations/proj/80145?culture=en-CA; Canadian Environmental Assessment Registry, "Sundog Renewable Generating Station Project" (14 February 2018) Government of Canada online: https://www.ceaa.gc.ca/050/evaluations/proj/80146?culture=en-CA.

[253] *SARA*, ss 34, 35 & 80.



Environmental Concerns

A major difference between the two main types of hydroelectric projects, dams and run-of-river projects, can be found in the environmental consequences associated with each. Large dams require substantial flooding and the water stored in these flooded reservoirs moves in and out, dependent upon the power needs for the dam, thereby creating an ever fluctuating aquatic system. In turn, these constant changes make it difficult for aquatic organisms to adapt and reservoirs end up being relatively lifeless with very few living organisms.[254]

With hydroelectric development, connectivity of the riverine ecosystems is also impaired, requiring mitigation to allow for fish movement, to varying degrees of effectiveness.[255] Overall, dams fragment rivers, interfere with fish migration, deplete the oxygen levels available for aquatic animals living in reservoirs, and trap and change sediment in affected river systems and each of these effects have various consequences for the natural river ecosystem.[256]

[254] Union of Concerned Scientists, "Environmental Impacts of Hydroelectric Power" online: https://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/environmental-impacts-hydroelectric-power.html#references.

[255] Nick Pink, *Hydro: this isn't the renewable energy resource you're looking for* (June 2017) Alberta Wilderness Association at 2 online: https://albertawilderness.ca/wordpress/wp-content/uploads/2017/07/20170600_ar_wla_update_hydro_npink.pdf [Nick Pink].

[256] Nick Pink at 2.

To counter these negative effects, hydroelectric projects were historically touted as being carbon-neutral, however, recent studies have brought this claim into question.[257] It has now been found that the flooding of large areas, particularly those previously made up of terrestrial organisms, results in the large-scale release of methane gas, a GHG which contributes to climate change.[258] This finding detracts from the carbon neutral reputation of hydroelectric dams.

Run-of-river projects, in contrast, are often applauded for having comparatively less effect on the surrounding ecosystems. This is in part because run-of-river projects do not require large flooded areas and do not dramatically transform river ecosystems. However, these projects also come with their own environmental risks. These risks include: effects on the water flow and temperature which can impact fish populations; increased access roads which fragment otherwise remote landscapes; and increased infrastructure which can lead to sedimentation in the river systems.[259] Additionally, because run-of-river projects provide significantly less power output than dams, more of them would be needed to fill the gap left by decreased fossil fuel usage.[260]

Oldman River Dam main spillway; image by C. Davies courtesy Pincher Creek Voice

[257] Bridget R. Deemer et al, "Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis" (November 2016) 66:11 BioScience 949 [Deemer].

[258] Deemer.

[259] Energy BC, "Run of River Power" Government of British Columbia online: http://www.energybc.ca/runofriver.html [Energy BC].

[260] Energy BC.

Economic Constraints

Although hydroelectricity is often praised for being a baseline power with a long active lifespan, it also comes with high up-front costs. As other renewable energy sources continue to be developed and become more affordable, hydroelectricity is slowly becoming a less competitive energy source and the high capital costs are becoming more of a deterrent.

A 2013 Report on Hydroelectric Development, "*Review of the Potential for Expanded Hydroelectric Energy Production in Northern Alberta"* submitted by the Standing Committee on Resource Stewardship for the Government of Alberta found that although the low-end cost for hydroelectric projects, (i.e. the cost that could be achieved with a low-cost, high-capacity facility) was comparable to other renewable energy sources such as wind and non-renewable sources such as natural gas, the high-end cost was not. Rather, the high-end cost for hydroelectricity (the cost for a high-cost, low-capacity facility) was significantly more than the high-end cost for these other energy sources. This cost comparison is further compounded by the fact that many of the most efficient hydroelectric project locations have already been developed and that renewable energy projects have gotten even cheaper since 2013 – this can be seen in the record-low cost obtained for wind energy projects in the first round of Renewable Energy Program Rounds, released December 2017.

FINAL THOUGHTS

Each year brings with it increased focus on new renewable energy technologies in Canada, including those listed in this report. However, despite this renewed interest, the oil and gas industry continues to receive significant financial incentives and other support from governments across the country. For example, in 2011, the International Monetary Fund estimated that Canada was supplying oil and gas producers with $34 billion in annual subsidies. This is a great deal more than the support available for renewable energy and this has made it more difficult for new technology to establish a level playing field in the energy production market.[261]

Political will and renewed investment in renewable energy has led to an increase in renewable energy sources, however, as you read throughout this primer, Alberta is still lacking a strong regulatory framework for new renewable energy sources, particularly for wind, solar and geothermal. A clear and streamlined regulatory process will help to encourage more investment in these technologies and will help to ensure that any risks associated with increased infrastructure are mitigated.

While these changes are slowly occurring, adaptation to the ever-increasing effects of climate change is necessary. In this light, the next volume in this report will look at the adaptation side of climate change. In particular, it considers how climate change is expected to impact natural resources, infrastructure, industry, biodiversity and human health in Alberta, as well as the legal measures that could help with adapting to these impacts.

[261] CANSIA at 9.