MOVING FORWARD BY LOOKING BACK: TOWARD A RENEWABLE CONSERVATION SCHEME IN ALBERTA

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This article addresses unique features of renewable energy sources, including wind, hydro, solar, and geothermal, and the obstacles to developing them in Alberta. The authors analyze whether a provincial regulatory regime governing all energy sources is possible. After reviewing the key features of Alberta's oil and gas conservation system regime, the authors conclude that based on Alberta's oil and gas experience, regulatory intervention for renewables can succeed in building an efficient energy industry. The authors suggest that Alberta implement a renewable conservation regime with features including renewable title, rights of entry, unitization of resources, and renewable resources.

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I. INTRODUCTION

Not a day goes by without a news story about renewable energy, whether focused on Alberta, the rest of Canada, or around the world. Shortly after his inauguration, United States' President Joe Biden issued a number of executive orders, including directions to federal agencies to eliminate fossil fuel subsidies, identify opportunities for the deployment of clean energy technologies, and ensure that steps are taken to accelerate clean energy.[1] Closer to home, the Government of Canada released its plan for *A Healthy Environment and a Healthy Economy*[2] in December 2020.[3] Among other things, this plan notes that the Government of Canada "is phasing-out coal-fired power across Canada by 2030, [and] increasing the supply of non-emitting power generation from coast to coast to coast."[4] The federal plan also notes that, "[b]y 2050, Canada will need to produce up to two to three times as much clean power as it does right now."[5]

In Alberta, Minister of Energy Sonya Savage noted Alberta's "work to ensure market-driven renewable power, without the need for costly direct subsidy, is a part of Alberta's future electricity mix" in a letter to the Alberta Electric System Operator (AESO) ending further procurement under the Renewable Electricity Program.[6] At the same time, Alberta's *Renewable Electricity Act* provides that "the promotion of renewable electricity generation is a core component of the Government of Alberta's overall approach to reducing greenhouse gas emissions and improving air quality."[7] Further, the *REA* sets a target that 30 percent of the electric energy in Alberta be produced from renewable sources by 2030.[8]

Policy-makers at the provincial and federal levels seem to be aligned in promoting development of renewable energy in Canada. In the private sector, recent developments suggest a strong desire to source renewable energy. In 2019, *Bloomberg NEF* reported record purchases of clean energy by corporations, up 40 percent from 2018.[9] Investment funds are increasingly hesitant to fund some categories of non-renewable hydrocarbon projects,[10] and

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1 US, The White House, *Fact Sheet: President Biden Takes Executive Actions to Tackle the Climate Crisis at Home and Abroad, Create Jobs, and Restore Scientific Integrity Across Federal Government* (27 January 2021), online: <www.whitehouse.gov/briefing-room/statements-releases/2021/01/27/fact-sheet-president-biden-takes-executive-actions-to-tackle-the-climate-crisis-at-home-and-abroad-create-jobs-and-restore-scientific-integrity-across-federal-government/>.

2 Environment and Climate Change Canada, *A Healthy Environment and a Healthy Economy: Canada's Strengthened Climate Plan to Create Jobs and Support People, Communities and the Planet* (Gatineau: Environment and Climate Change Canada, 2020).

3 Prime Minister of Canada, Justin Trudeau, "Prime Minister Announces Canada's Strengthened Climate Plan to Protect the Environment, Create Jobs, and Support Communities" (11 December 2020), online: <pm.gc.ca/en/news/news-releases/2020/12/11/prime-minister-announces-canadas-strengthened-climate-plan-protect>.

4 Environment and Climate Change Canada, *supra* note 2 at 20.

5 *Ibid*.

6 Letter from Sonya Savage, Energy Minister of Alberta to Michael Law, President and Chief Executive Officer of Alberta Electric System Operator (10 June 2019).

7 SA 2016, c R-16.5 at preamble [*REA*].

8 *Ibid*, s.2(1).

9 Veronika Henze, "Corporate Clean Energy Buying Leapt 44% in 2019, Sets New Record," *BloombergNEF* (28 January 2020), online: <about.bnef.com/blog/corporate-clean-energy-buying-leapt-44-in-2019-sets-new-record/>.

10 Goldman Sachs, "Environmental Policy Framework" (2019), online: <www.goldmansachs.com/s/environmental-policy-framework/#climateChangeGuidelines>.

Canadian companies, including oil and gas producers, have called upon the federal government to make investments in a green recovery following the COVID-19 pandemic.[11]

At the same time, Alberta has substantial renewable energy resources available to generate electricity, with significant wind and photovoltaic potential identified in the southern and eastern parts of Alberta,[12] while inactive oil and gas wells may be repurposed to capture geothermal energy.[13] Many renewable projects have already been built in Alberta, and the convergence of market demand and policy directions suggest that additions to renewable energy generation are likely in the near future.

Although there are many benefits to renewable electricity, obstacles to the development of renewable electricity remain. In Alberta's competitive electricity market, where wind, solar, and other renewables compete for the right to sell electricity into the power pool, the ability to recover the initial investment and make a profit creates a risk to renewable project proponents, as there is no guarantee they will recover their capital investment. In addition, recent research has identified a number of barriers to the adoption of wind energy in Alberta, including a lack of public trust in the decision-making process concerning project siting and the perception of procedural unfairness.[14]

Accordingly, a new framework may be necessary and desirable to address current obstacles to the further development of renewable energy in Alberta. We suggest that Alberta's existing oil and gas conservation regime, with some modifications, can provide a useful template for a renewable conservation regime to promote the development of renewables and prevent waste of Alberta's renewable energy resources.

II. WASTE OF RENEWABLE ENERGY RESOURCES

As in the early days of the oil and gas industry, the accelerating development of renewable energy resources raises concerns about inefficient or wasteful production. In the oil and gas context, an operator may harvest a significant amount of potential energy[15] from a relatively small surface disturbance. This harvesting is wasteful where it unreasonably impairs the ability of other mineral interest holders, such as holders of adjacent lands or rights to different hydrocarbon stages, from gathering the resources to which they are entitled. This situation is reversed for renewables. The energy source, be it wind, sunlight, or water, is readily replenished but the surface area needed to gather these resources can be extensive and favourable locations can be limited. As an example, inefficient solar electricity generation

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11 CK Staff, "Open Letter from Business Leaders Calls for Bold Green Recovery," *Corporate Knights* (29 June 2020), online: <www.corporateknights.com/leadership/open-letter-business-leaders-calls-bold-green-recovery/>.

12 Canadian Geographic, "Wind Energy in Canada/L'energie éolienne au Canada" (9 September 2009); Global Solar Atlas, "Global Photovoltaic Power Potential: Country Factsheet Canada" (2021), online: <globalsolaratlas.info/global-pv-potential-study>.

13 Government of Alberta, "Clearing a Path for Geothermal Resource Development," online: <www.alberta.ca/clearing-a-path-for-geothermal-resource-development.aspx#>.

14 Sonak Patel et al, "Assessing Barriers to Renewable Energy Development in Alberta: Evidence from a Survey on Wind Energy with Rural Landowners" (1 May 2020) University of Alberta, Resource Economics and Environmental Sociology Project Report No 20-01 at 11–15, 41–46, online: <www.ualberta.ca/resource-economics-environmental-sociology/media-library/research/project-reports/documents/pr-20-01-alberta-wind-energy-rural-landowner-report.pdf>.

15 That is, oil, gas, or both.

will not reduce the amount of sun available in the future in the way that inefficient natural gas production will permanently reduce the future production of gas or oil. Instead, inefficient solar electricity generation will impair the rights of competing land users and will impair overall local solar electricity generation, given the limited availability of suitable land.

Our working definition of waste and its remedy, conservation, are largely aligned with Greg Moores, Mark Andrews, and Amanda Whitehead who note, in the context of the offshore oil and gas sector, that "waste occurs in relation to an optimized production baseline that is based on sound engineering and economic principles. Under such an approach, producing less than this baseline would be considered wasteful."[16] Conversely, conservation ensures the "manner of recovery and distribution of use over time … maximizes benefit to society."[17]

In both the oil and gas and renewables contexts, the object of conservation is to maximize the value of a finite quantity of resources. In both cases, waste can occur where production exceeds transportation or market capacity.[18] However, with oil and gas, it is the energy source itself that is finite and must be conserved. With renewable energy resources, it is the availability of suitable gathering areas that is finite.

Government policy to increase the use of renewable resources plays an additional factor in discussing the conservation, efficient use, and waste of renewable energy resources. Although the *REA* sets a target of 30 percent of electricity generated from renewable sources by 2030,[19] the AESO recently predicted that this target will be missed.[20] With this policy target in place, the under-performing or inefficient development of Alberta's renewable energy resources is another key aspect of waste.

III. OBSTACLES TO EFFICIENT RENEWABLE ELECTRICITY DEVELOPMENT IN ALBERTA

Before looking to a future regulatory regime, it is necessary to understand the current regulatory framework and potential obstacles that the framework places on the efficient development of renewable electricity generation in Alberta.

A. PERMITTING AND CONSTRUCTION

Pursuant to the *Hydro and Electric Energy Act*, no power plant, renewable or otherwise, can be constructed or operated without the approval of the Alberta Utilities Commission (AUC).[21] The test for approval of a power plant, regardless of the energy source, is: "whether construction or operation of the proposed hydro development [or] power plant … is in the

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16 Greg Moores, Mark Andrews & Amanda Whitehead, "Waste Not, Want Not: 'Waste' as a Tool of Resource Conservation in the Atlantic Canadian Offshore" (2018) 56:2 Alta L Rev 315 at 335.

17 Stephen L McDonald, "Unit Operation of Oil Reservoirs as an Instrument of Conservation" (1973) 49:2 Notre Dame Lawyer 305 at 308–309.

18 *Oil and Gas Conservation Act*, RSA 2000, c O-6, s 1(ddd)(vii) [*OGCA*].

19 *Supra* note 7, s 2.

20 Alberta Electric System Operator, *AESO 2019 Long-Term Outlook* (September 2019) at 23, online: <www.aeso.ca/assets/Uploads/AESO-2019-LTO-updated-10-17-19.pdf>.

21 RSA 2000, c H-16, ss 8–9, 11 [*HEEA*].

public interest, having regard to the social and economic effects of the development [or] plant, … and the effects of the development [or] plant … on the environment."[22] Except with respect to hydro developments, the AUC is specifically precluded from considering whether proposed power plants will be an economic source of electricity.[23]

Guidance for the approval of power plants is found in the AUC's *Rule 007*.[24] Of particular importance, *Rule 007* requires all renewable projects to demonstrate compliance with the AUC's *Rule 012: Noise Control*.[25] Among other things, *Rule 012* requires a generating facility to produce noise at or below the permissible sound levels (PSL).[26] The applicant must provide a Noise Impact Assessment (NIA) which predicts compliance with the PSL, including the "cumulative sound level" that includes noise contributions from existing facilities, approved but not constructed facilities, facilities "deemed complete" under *Rule 007*, and noise from the proposed facility.[27]

The *Rule 012* requirement to demonstrate compliance with the PSL creates a constraint on wind energy development in particular, potentially leading to waste. We do not mean to suggest that the PSL in *Rule 012* should be reduced or varied to permit the development of additional renewable projects. Indeed, research has shown that the noise impact from nearby wind turbines is a significant barrier to the adoption of wind energy in Alberta.[28] If the ultimate goal is increased renewable energy development in Alberta, relaxing the PSL under *Rule 012* would seem to be contrary to that goal. Rather, we suggest that a regulatory mechanism should be implemented which will foster the development of wind energy while maintaining the current PSL.

Currently, *Rule 012* effectively privileges the first-in-time facility, potentially with the effect of reducing the overall amount of renewable energy which can be developed. If the cumulative sound level of existing energy facilities within a local geographic area is at or near the PSL, either additional generation facilities can be installed or any new facilities must operate at less than their full potential. This is of particular concern given the concentration of wind generation in the southern portion of the province and the corresponding possibility of waste through the inefficient development of wind resources in Alberta.

This concern is not merely theoretical, as a series of decisions from the AUC demonstrates. In 2011 and 2012, the AUC grappled with the cumulative noise impacts of neighbouring wind projects and, in doing so, highlighted *Rule 012*'s potentially wasteful effect.

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22 *Alberta Utilities Commission Act*, SA 2007, c A-37.2, s 17(1) [*AUCA*].

23 *HEEA*, *supra* note 21, s 3(1)(c).

24 Alberta Utilities Commission, *Rule 007: Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments* (1 August 2019), online: <www.auc.ab.ca/Shared%20Documents/Rules/Rule007.pdf > [*Rule 007*].

25 *Ibid*, s 1.4.3; Alberta Utilities Commission, *Rule 012: Noise Control* (2 March 2020), online: <www.auc.ab.ca/regulatory_documents/Consultations/2020-03-02-Rule012.pdf> [*Rule 012*].

26 *Rule 012*, *ibid*.

27 *Ibid*, s 2.7(1); *Rule 007*, *supra* note 24, s 3.2.

28 Patel et al, *supra* note 14 at 45.

In the *Heritage Decision*, the AUC considered an application from Heritage Wind Farm Development Inc. (Heritage) for approval of a 291-MW wind facility.[29] Heritage's initial NIA predicted that the cumulative impacts of the proposed project and previously approved wind projects would result in exceeding the nighttime PSL at 22 receptors.[30] To secure approval of its project, Heritage committed to shutting down 57 of its turbines and programming 38 turbines to operate in sound-reducing modes during nighttime hours.[31] Although not a complete shutdown, sound-reducing modes reduce the noise generated by the turbines at the cost of reduced electricity output.[32] In other words, Heritage traded reduced electricity production in peak nighttime periods and reduced revenue-generating opportunities to ensure its project would be approved.

After conditionally approving Heritage's application, the AUC considered an application by Geilectric Inc. (Geilectric) for approval of a 69-MW wind facility.[33] Similar to Heritage, accounting for the cumulative impacts of previously approved projects, Geilectric had to curtail some of its generation in order to meet the nighttime PSL.[34] Had Geilectric not committed to curtailment, its application would not likely have been successful.

Next, the AUC considered an application from Windy Point Wind Park Ltd. (Windy Point) for approval of its 63-MW wind facility.[35] Windy Point's NIA included noise contributions from six nearby wind projects, including the Heritage and Geilectric projects.[36] To meet the PSL at most receptors, Windy Point had to switch off or operate all of its turbines in reduced sound modes at night.[37] Unlike the Heritage and Geilectric projects, all of Windy Point's 21 turbines had to be curtailed at night: 11 would operate in reduced sound mode and 10 would be shut down entirely.[38] Ultimately, the AUC approved Windy Point's application with the condition that the proposed noise control measures be implemented.[39]

The following table from the *Windy Point Decision* summarizes the projects considered by the AUC in the *Heritage Decision*, *Geilectric Decision*, and *Windy Point Decision*, and the existing facilities evaluated in the associated NIAs.[40]

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29 *Heritage Wind Farm Development Inc: Heritage Wind Farm Power Plant* (2 June 2011), Decision 2011-239, online: AUC <www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2011/2011-239.pdf> [*Heritage Decision*].

30 *Ibid* at para 18.

31 *Ibid* at para 19.

32 *Ibid* at para 17.

33 *Geilectric Inc: New 69-MW Welsch Wind Power Project and Welsch Substation* (6 February 2012), Decision 2012-038, online: AUC <www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2012/2012-038.pdf> [*Geilectric Decision*].

34 *Ibid* at para 29.

35 *Windy Point Wind Park Ltd: Windy Point Wind Park Power Plant* (31 July 2012), Decision 2012-205, online: AUC <www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2012/2012-205.pdf> [*Windy Point Decision*].

36 *Ibid*.

37 *Ibid* at para 44, Table 1 (Table 1 reproduced below).

38 *Ibid* at para 27, Table 1.

39 *Ibid* at paras 44–45.

40 *Ibid* at para 27, Table 1.

TABLE 1: ASSUMED WIND TURBINE OPERATIONAL DATE FOR THE NIGHT TIME PERIOD[41]

Wind Farm	Number of Wind Turbines			
	Switched Off	Running with Adjustment	Running without Adjustment	Total
Windy Point	11	10	0	21
Welsch	0	0	26	26
Heritage	48	50	0	98
Summerview Phase I and Phase II	0	0	61	61
Oldman River and Oldman 2	0	0	22	22

Of particular note are the last two lines, showing that the pre-existing Oldman and Summerview facilities were not required to curtail their generation to meet the PSL. Only the later-approved projects were required to curtail. As wind resources are transitory and fleeting, the operators of those facilities have, in effect, permanently lost the ability to generate to the full potential of their facilities. Beyond the immediate economic effect on the operators, it may be that Alberta has been deprived of incremental renewable generation, at least for the life of the projects.

While developers have some ability to adjust the location of wind turbines to minimize noise, in order to develop the same resource and meet the regulatory requirements, subsequent entrants near existing facilities must agree to use less of the available wind resource. This raises the possibility that less electricity is generated from the available wind resource than might otherwise be generated. Since wind energy cannot currently be stored, any opportunity not taken to generate electricity from wind is forever lost. Thus, the current regulatory regime creates the possibility, if not the reality, that Alberta's wind resources are subject to waste.

Assuming PSLs remain constant at their current levels, further analysis would be necessary to determine the optimal allocation of capacity as between the various operators in a given area. It may be, for example, that the AUC's approvals have resulted in the optimal allocation of generation capacity as determined by the maximum PSL. However, the AUC does not currently consider the optimal allocation of that capacity; the AUC looks only at how compliance with the PSL is achieved.

Given the express limitation on the AUC's authority to consider whether the development is an "economic source of electric energy in Alberta or to whether there is a need for the electric energy to be produced by such a facility in meeting the requirements for electric

41 *Ibid* (Table 1 reproduced here without notes).

energy in Alberta,"[42] it seems doubtful that the AUC has the jurisdiction to consider maximizing the electricity generated from existing wind resources when approving facilities. Also, there appears to be no formal mechanism, whether under the applicable statutes or the AUC rules, by which the AUC could order curtailment of an existing generating facility to maximize total generation from renewable resources. Such an order would certainly raise questions of fairness, given the likely expectation of existing generating facility owners that they will be permitted to generate under the conditions approved in their initial applications.

Finally, on this point, except in limited circumstances there is currently little, if any, incentive for the owner of an existing generating facility to curtail its generation to allow for the development of a new facility owned by an arms-length party. The AUC's recent decision on Enel Alberta Wind Inc.'s (Enel) application for its Castle Rock Ridge Phase II project is illustrative on this point.[43] In an NIA, Enel assumed that TransAlta, the owner of a nearby wind generation facility required to be included in the assessment, would curtail two of its turbines, allowing Enel to meet the PSL.[44] However, TransAlta indicated that it had not discussed or contemplated such an agreement with Enel.[45] Without curtailment from TransAlta, Enel was only able to meet its PSL by committing to curtailing turbines at the Castle Rock Ridge Phase II project, the existing Castle Rock Ridge I facility, and its proposed Riverview facility (Riverview).[46] Enel was ultimately successful, but the decision illustrates the difficulty faced by new entrants in areas with significant wind generation already developed. As the AUC found:

> The Commission emphasizes that its determination on compliance is premised, in part, on Enel's commitment to nighttime curtailment of certain turbines included in its Riverview project, which is the subject of a separate proceeding before the Commission.… Failure of Enel to abide by this commitment, should the Riverview project be approved, could constitute grounds for the Commission to review its approval of this project on its own motion.[47]

Enel's ability to commit to curtailing its existing and proposed facilities, as a result of its ownership position, was necessary for it to proceed with the Castle Rock Ridge facility. For a project proponent without ownership of neighbouring projects, a similar situation would present a significant and potentially insurmountable obstacle. To secure approval, the proponent would be required to reach agreements with neighbouring facilities regarding curtailment, reduce the number of turbines in its project to comply with the PSL, or simply not proceed at all. From the perspective of encouraging the development of renewable electricity in Alberta and avoiding waste through lost opportunities to generate, none of these outcomes is desirable.

In the first situation, the owner of a neighbouring facility could validly withhold their consent to curtailment or demand a price for curtailment high enough to render the proposed project uneconomic, both of which would effectively halt the application. This situation

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42 *HEEA*, *supra* note 21, s 3(1)(c).
43 *Enel Alberta Wind Inc: Castle Rock Ridge Phase II Wind Power Project* (27 June 2019), Decision 23753-D01-2019 , online: AUC <efiling-webapi.auc.ab.ca/Document/Get/649982>.
44 *Ibid* at para 27.
45 *Ibid* at para 28.
46 *Ibid* at para 31.
47 *Ibid* at para 73.

raises the possibility that incumbents may use their market position to prevent new entrants into the renewable energy sector. Assuming an incumbent would behave the same way regardless of the identity of the new entrant, the net result would either sterilize the area from further wind energy development or result in the incumbent being the only party capable of developing. This behaviour would discourage the development of Alberta's renewable resources. We note that the behaviour described above could potentially attract scrutiny and remedy under the "abuse of dominance" provisions of the federal *Competition Act*.[48] However, given the multiple factors which are at issue in such proceedings, it is unclear whether this conduct would fall within those provisions or whether a remedy would be available.

The second and third situations described above are similarly undesirable from a perspective of maximizing the development of Alberta's renewable energy resources. A proponent reducing the number of turbines in its development would likely result in less renewable energy generated from the available wind resources. Similarly, a proponent not building at all amounts to a loss of productive capacity at least until a proponent with control of neighbouring facilities elects to proceed with development and, in our view, constitutes waste.

We have not done the analysis, and it is outside the scope of the article, to determine the optimal number of turbines or generation in any specific area of Alberta. Such an analysis would necessarily have to balance the incremental energy generation from additional turbines against the losses from curtailment, all while meeting the PSL and would require significant technical input from industry stakeholders and experts.

B. MARKETING OF ELECTRICITY

As many readers will know, electricity in Alberta is priced in a competitive market. Briefly, every generating unit must make offers to supply electricity for each of 24 one-hour blocks in each day on the basis of a price/quantity pair and their available capacity. For each block, the AESO arranges all offers received from lowest priced to highest priced in the Merit Market Order (MMO) and dispatches generating units on, starting with the lowest priced offer until the demand for electricity in that block is met. The last offer dispatched on establishes the system marginal price (SMP). Generators who are dispatched on receive the average of all 60 one-minute SMP's (the Pool Price) for the electricity they generate in each hour.[49] Since 2015, wind energy has been fully dispatchable in the MMO with solar following in 2018.[50] All generating sources in Alberta are treated equally with respect to their position in the MMO and the opportunity to generate electricity and earn income. However, the intermittency and variability of some renewable energy sources, combined with the

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48 RSC 1985, c C-34, s 79.

49 Alberta Electric System Operator, "Guide to Understanding Alberta's Electricity Market," online: <www.aeso.ca/aeso/training/guide-to-understanding-albertas-electricity-market/>.

50 Alberta Electric System Operator, *ISO Rules Final Filing Draft Version 2.0* (8 September 2014), ss 304.3, 306.5, 502.1; Alberta Electric System Operator, *ISO Rules* (1 September 2018), s 304.3, online: <www.aeso.ca/rules-standards-and-tariff/iso-rules/section-304-3-wind-power-ramp-up-management/download/304.3-Wind-and-Solar-Power-Ramp-Up-Management-2018-09-01.pdf>; Alberta Electric System Operator, *ISO Rules* (1 April 2015), s 306.5, online: <www.aeso.ca/rules-standards-and-tariff/iso-rules/section-306-5-generation-outage-reporting-and-coordination/>.

competitive market in Alberta, results in different incentives for renewable generators and presents a potential obstacle to the development of Alberta's renewable energy resources.

Under Alberta's current market framework, the only way any particular generator can have any assurance that they will be able to generate and earn an income is to make a "zero-dollar offer," essentially offering to generate for free.[51] As it is almost certain the SMP in any minute will be greater than zero, a zero-dollar offer will likely be "in-merit," and that generating unit will be dispatched on.[52] Low- or zero-dollar offers have historically been used by coal and other baseload generators, for whom starting and stopping frequently can incur significant costs and take a significant amount of time to ramp-up and ramp-down, to ensure that they will be able to continue generating.[53]

As no generating units in Alberta are precluded from making a zero-dollar offer, it is possible that, with enough zero-dollar offers, the SMP will reach zero. On 30 June 2002, the pool price in Alberta hit $0.01/MWh for the first time, as a result of zero-dollar offers.[54] This was concerning enough to the Market Surveillance Administrator (MSA) that the MSA conducted a study of zero-dollar offer behaviour in Alberta.[55] Although the MSA then concluded that it was not clear that the impact of zero-dollar offers on the market was significant,[56] the MSA noted that "zero offer behaviour could be viewed to be decreasing the level of competition in the market."[57]

Zero-dollar market events have been more frequent since the MSA report in 2003. From 2000 to July 2017, zero-dollar hours occurred 108 times, with 41 of those occurrences between January and July 2017.[58] Zero-dollar hours appear to be associated with higher wind generation.[59] Beyond zero-dollar hours, increased wind generation is associated with a lower annual pool price in Alberta.[60]

This relationship can likely be explained, at least in part, by the incentives created by Alberta's electricity market structure. Due to the intermittent nature of renewable energy sources, owners of renewable generating units have a strong incentive to make zero-dollar offers to ensure that they are dispatched on. Wind generators must "make hay while the wind blows" and the best way to do so is to make a zero-dollar offer which will likely enable them to generate.

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51 Market Surveillance Administrator, "Zero Dollar Offers" (29 April 2003) at 1, online: <www.albertamsa.ca/assets/Documents/Zero-Dollar-Offers-April-2003.pdf>.

52 *Ibid* at 1–2.

53 *Ibid* at 8.

54 *Ibid* at 1.

55 *Ibid*.

56 *Ibid* at 23.

57 *Ibid*.

58 Canada Energy Regulator, "Market Snapshot: Alberta Wholesale Electricity Prices in 2017 Set Record for Number of $0 Hours" (6 September 2017), online: <www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2017/market-snapshot-alberta-wholesale-electricity-prices-in-2017-set-record-number-0-hours.html?=undefined&wbdisable=true#wb-info>.

59 *Ibid*.

60 Market Surveillance Administrator, "Quarterly Report for Q4 2020" (12 February 2021) at 3, online: <www.albertamsa.ca/assets/Documents/Q4-2020-Quarterly-Report.pdf>.

Alberta's wind power generation facilities are concentrated in the southwestern portion of the province.[61] Local wind conditions thus strongly impact the availability of wind electricity to be dispatched on. Assuming that some or all of the wind generating units are offering at or near zero dollars to ensure that they can generate when the wind is available, it stands to reason that the SMP and pool price would decrease accordingly. This is borne out empirically as the "AESO 2020 Annual Market Statistics" show that wind is the only generation source which consistently receives a discount to the pool price.[62] Further, the AESO notes that, when the wind blows in a region, all available wind is utilized and that wind generation tends to reduce the SMP.[63]

The intermittency of renewable resources appears to create an over-production problem as each individual generating unit is incented to produce as much as it can, whenever it can, in the hope of generating revenue. In the case of wind, this depresses power prices and reduces the return from wind generation. Consequently, there is no real relationship between the offered price and the cost of production from an individual generating unit. Notably, a similar problem faced the early stage oil industry in Alberta; the McGillivray Commission noted that "it is a matter of public interest in that production regardless of the relation between cost and price inevitably leads to over-production and over-production leads to prices which in time may result in the undermining of the industry's economic structure and chaos."[64]

With wind power consistently receiving a discount to the pool price, it is perhaps unsurprising that wind projects have historically had difficulty obtaining debt financing.[65] Other jurisdictions have addressed similar problems through the implementation of priority dispatch for renewables,[66] and others have implemented feed-in tariffs.[67] These strategies have attracted criticism and seem unlikely to be implemented in Alberta.

C. AVAILABILITY OF LAND

Currently, the only means by which a renewable project proponent can obtain the right to capture solar or wind energy is through negotiation of a lease or purchase with the surface title owner. As such, with the exception of geothermal,[68] the right to capture renewable

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61 Alberta Electric System Operator, *AESO 2020 Annual Market Statistics* (March 2021) at 24, online: <www.aeso.ca/assets/Uploads/2020-Annual-Market-Stats-Final.pdf> ["AESO 2020"].

62 The achieved premium to pool price is calculated as the ratio of the achieved margin to the average pool price for each year. An achieved premium of zero indicates that the achieved price is equal to the average pool price. An achieved premium of 100 percent indicates that the achieved price is double the average pool price. An achieved discount of 50 percent, such as an achieved premium of negative 50 percent, indicates that the achieved price is half the average pool price (*ibid* at 19).

63 *Ibid.*

64 Alberta, *Alberta's Oil Industry: The Report of a Royal Commission Appointed by the Government of the Province of Alberta under The Public Inquiries Act to Inquire into Matters Connected with Petroleum and Petroleum Products*, (1940) (Chair: Justice AA McGillivray) at 23 ["McGillivray Report"].

65 KPMG, "Alberta's Future Energy Mix: Exploring the Potential for Renewables" (February 2014) at 2, online: <assets.kpmg/content/dam/kpmg/pdf/2014/07/KPMG-Issue3-Alberta-FINAL-web-Jul2014.pdf>.

66 European Commission, Commission, *Directive 2009/28/EC of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC*, [2009] OJ L 140/16 at art 16, s 2(c).

67 For example, in Ontario, see Independent Electricity System Operator, "A Progress Report on Contracted Electricity Supply, Third Quarter 2020" (2020) at 20, online: <www.ieso.ca/-/media/Files/IESO/Document-Library/contracted-electricity-supply/Progress-Report-Contracted-Supply-Q3-2020.ashx>.

68 As a result of the recently passed *Geothermal Resource Development Act*, SA 2020, c G-5.5 [*GRDA*].

resources to generate electricity de facto runs with the surface title. Although this presents an opportunity for the surface owner to earn income, it presents a potential obstacle to maximizing the amount of renewable energy generated in Alberta, particularly wind.

Like reservoirs of oil and gas, wind and solar resources do not follow the dividing lines between surface parcels. Unlike oil and gas reservoirs, generating electricity from wind and solar does not permanently deplete the resource, though in the case of wind facilities turbulence impacts from turbines may reduce the productivity of and increase wear and tear on neighbouring wind facilities.[69] Thus, the optimal distribution of wind turbines may not reflect the status of the surface title. Therefore, a surface title holder who is unwilling to lease or sell to a wind developer may result in sub-optimal distribution of turbines and reduce the amount of electricity which can be generated from the existing resources, creating waste.

D. COMPETING LAND USES

Lands ideally suited for renewable electricity generation will also inevitably be subject to competing use, with agriculture as a particularly important competing use.

Wind generation has been concentrated in rural, agricultural areas, and seems likely to stay that way. Wind generation and agriculture are reasonably compatible land use options. A typical wind turbine will have a surface footprint of one-half to one-and-one-half acres (less than a typical oil well pad site), inclusive of an access road,[70] meaning that a wind facility may take relatively little land out of cultivation. Mid-field wind turbines and access roads will hinder the machinery used in modern cultivation farming, causing increased wear and additional time, but this can be resolved by appropriate compensation negotiated between the landowner and the generator, as it is in the context of oil and gas production and electricity transmission.[71] Wind generation is less compatible with built-up land use. Noise and visual effect may discourage residential building, and wind turbines may require neighbouring development to be set back to mitigate safety concerns caused, for example, by ice shedding.[72]

Large-scale solar generation has also been concentrated in rural areas, where a generating facility may occupy seven acres for every megawatt produced.[73] Solar generation is not generally compatible with agriculture — land used to host solar panels cannot generally be cropped, and cattle may interfere with equipment and infrastructure.[74] Solar generation is somewhat compatible with built-up areas, as solar panels may be mounted on rooftops. Solar generation may also be compatible with wind generation. For example, Vulcan Solar Hybrid Energy Centre GP Inc. has AUC approval to construct a major solar generation facility within the boundaries of the Blackspring Ridge Wind Project.[75]

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69 *Heritage Decision*, *supra* note 29 at para 10.

70 Government of Alberta, Farmers' Advocate Office, *Renewable Energy in Alberta* (Edmonton: Farmers' Advocate Office, 14 August 2017) at 12 [Farmers' Advocate Office, *Renewable Energy*].

71 See e.g. *Bonterra Energy Corp v Rosell*, 2019 ABSRB 586 at para 50.

72 Farmers' Advocate Office, *Renewable Energy*, *supra* note 70 at 12.

73 *Ibid* at 7.

74 *Ibid*. Although sheep may apparently be a low-impact grazing option that can coexist with solar generation.

75 *Vulcan Solar Hybrid Energy Centre GP Inc: Vulcan Solar Project* (25 October 2016), Decision 21897-D01-2016 at paras 7, 28, online: AUC <efiling-webapi.auc.ab.ca/Document/Get/595440>.

The surface-intensive nature of wind and solar development means that they may result in land use conflicts, as do oil and gas production. Agriculture continues to be a driver of Alberta's economy, and converting vast stretches of arable land to renewable generation will not likely be a sound policy decision. The land use conflicts between renewable electricity generation, agriculture, and environmental conservation will likely increase along with increased renewable generation capacity and may ultimately require regulatory intervention. It is our view that, at least in part, the solution to the issues we have identified above can be found by looking to Alberta's existing oil and gas conservation regime.

IV. CONSERVATION AND WASTE IN THE OIL AND GAS INDUSTRY[76]

Alberta's oil and gas conservation regime developed in response to inefficient practices in the early decades of the oil and gas industry.[77] Alberta's first oil boom was touched off by an oil strike near Waterton Lakes in 1902,[78] followed by development in Turner Valley, where the story of oil and gas conservation in Alberta begins. The issues at Turner Valley were multifaceted. Some producers flared enormous amounts of natural gas to harvest small amounts of naptha.[79] Government and nearby municipalities were disturbed by the waste of usable or saleable natural gas,[80] and the quantity of both oil and captured gas being produced increasingly approached the limits of what could be sold locally,[81] risking a price collapse. This state of affairs was partly the result of the "rule of capture," which incentivized oil and gas interest holders to produce as much oil as quickly as possible, lest it be captured by neighbouring interest holders.[82]

By the 1930s, a critical mass of producers and government actors became seriously concerned about waste at Turner Valley,[83] leading to the passage of the first version of the *OGCA* in 1938.[84] This act created the Petroleum and Natural Gas Conservation Board (PNGCB), granting it significant regulatory and rule-making power.[85]

Following the passage of the *OGCA*, a public inquiry into waste and conservation in the oil and gas industry was commissioned (the McGillivray Commission). The commission's expert, Dr. Frey, began with the proposition that "all oil fields and every oil well in the field should be produced in such a manner as to produce the largest practical quantity of oil from

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76 We have relied heavily in this section on David H Breen, *Alberta's Petroleum Industry and the Conservation Board* (Edmonton, University of Alberta Press, 1993) and commend that work to readers interested in the history of the oil and gas industry in Alberta.

77 *Giant Grosmont Petroleums Ltd v Gulf Canada Resources Ltd*, 2001 ABCA 174 at para 29, leave to appeal to SCC refused, 28827 (28 February 2002) [*Grosmont*].

78 Breen, *supra* note 76 at 4.

79 *Ibid* at 134.

80 The gas waste was at around 250 million cubic feet per day (*ibid* at 115).

81 *Ibid* at 116.

82 *Anderson v Amoco Canada Oil & Gas*, 1998 ABQB 620 at para 131, rev'd on other grounds 2002 ABCA 162, aff'd 2004 SCC 49 [*Anderson*]; *Borys v CPR Co*, [1953] 2 DLR 65 at 68 (UKPC).

83 As early as 1912, a parliamentary report of the federal Commission of Conservation noted the "enormous quantities of natural gas [that] have been wasted [being ripe for] legislative control" (Breen, *supra* note 76 at 29).

84 Breen, *ibid* at 125.

85 *Ibid* at 125–127.

that well and field, and … every engineering effort should be made to prevent the waste of oil."[86] Similarly, the Chair of the PNGCB stated that:

> [T]he province of Alberta is the basic owner in that [Turner Valley] field … this Legislature is justified in making any move that it sees fit, making any law that might be as stringent as possible to see that conservation is effected down there, because already the people of the Province have lost a lot of money in that [unregulated] structure … if you cannot by legislation force conservation in the Turner Valley Field, … it would be my firm recommendation that [the] Government take over control of that field.[87]

Ultimately, the McGillivray Commission recommended, among other things, that unit operation be compelled in future fields where producers would not agree to operate as a unit voluntarily.[88]

The next phase of oil and gas conservation was triggered by the discovery of oil at Leduc in 1947 and other locations in central Alberta, which tripled crude oil production in Alberta in five years.[89] By the mid-1950s, the oil and gas conservation framework in Alberta had developed most of its current features, including the ability to curtail and prorate production,[90] and the predecessor of the current *Surface Rights Act*,[91] *The Right of Entry Arbitration Act*.[92] As with the current *SRA*, the *REAA* was enacted to permit development where surface title and mineral title were in separate hands.[93] Importantly, the *REAA* enabled the development of Alberta's oil and gas industry by removing the obstacle presented by surface owners opposed to development.

As was the case in 1938 and 1947, the key concept that underpins the oil and gas conservation regime in Alberta remains the minimization of waste.[94] Some of the stated purposes in the original *OGCA*[95] were ensuring the maximum production of petroleum could be obtained and ensuring that an equitable share of the market for petroleum was available to each well.[96] Similar purposes are found in the current *OGCA*, including effecting conservation and preventing waste of Alberta's oil and gas resources, providing for economic, orderly, and efficient resource development in the public interest, and affording each owner the opportunity to obtain their share of the production from a pool.[97]

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86 *Ibid* at 173, 703.
87 *Ibid* at 144.
88 *Ibid* at 184.
89 *Ibid* at 249.
90 Provided for currently by *OGCA* at section 34 and *Curtailment Rules* at Rule 2, which places limits on crude oil and bitumen production in the name of, "effect[ing] conservation and prevent wasteful operations, prevent[ing] improvident disposition, and ensur[ing] the economical development in the public interest of the crude bitumen and crude oil resources of Alberta"; *OGCA*, *supra* note 18, s 34; *Curtailment Rules*, Alta Reg 214/2018, r 2.
91 RSA 2000, c S-24 [*SRA*].
92 SA 1947, c 24.
93 Breen, *supra* note 76 at 253.
94 *Anderson*, *supra* note 82 at para 135; *Grosmont*, *supra* note 77 at para 26: "[t]he primary focus of the OGCA is to conserve and prevent waste of Alberta's oil and gas resources."
95 *The Oil and Gas Conservation Act, 1938*, SA 1938, c 15, s 6.
96 Breen, *supra* note 76 at 126, 696.
97 *Supra* note 18, s 4.

At its most basic level, the purpose of the *OGCA* is to ensure oil and gas resources are conserved and, correspondingly, not wasted.[98] Conservation:

> involves the efficient use of natural resources, the development of these resources in such a way as to protect the interests of future generations, and the elimination of all economically avoidable waste. It may be defined as "the preservation of natural resources for economical use." *The concept of the elimination of waste is paramount*.[99]

Under the *OGCA*, wasteful operations can be summarized as those that fail to employ the most effective engineering practices and tools of recovery that currently exist and that can be deployed profitably.[100] As discussed above, although wind, sunlight, or water as energy sources are renewable, inefficient practices may lead to the under-development of renewable resources. As with oil and gas resources, failing to employ the most effective practices and tools will result in waste: producing less than an optimized production baseline based on sound engineering and economic principles.[101] Accordingly, we suggest a similar approach to waste as contemplated in the *OGCA* can be applied to renewable resources in Alberta.

V. KEY FEATURES OF THE OIL AND GAS CONSERVATION REGIME IN ALBERTA

The key features of Alberta's existing oil and gas conservation regime established by a number of statutes and historical developments in the common law are briefly described below.

A. SPLIT TITLE AND RIGHTS OF ENTRY

Prior to 1889, the federal government sold homestead lands inclusive of mineral title in what was then the Northwest Territories. The federal government changed its approach by regulation in 1889, and from then on reserved "all mines and minerals" (including oil and gas) to the Crown in right of Canada from patents for land, "except in the case of patents for lands which have already been sold."[102] This had the effect of concentrating ownership of most mineral rights in the hands of a handful of parties: the federal Crown, the Hudson's Bay Company,[103] the Canadian Pacific Railway Company, and the Calgary and Edmonton Railway Company.[104] In the 1930s, a series of Natural Resource Transfer Agreements and Acts passed title to mines and minerals from the federal Crown to the provincial Crowns of Alberta, Saskatchewan, and Manitoba.[105]

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98 *Ibid*.

99 Breen, *supra* note 76 at xxix [emphasis added].

100 Jason Metcalf, "Waste in the Land of Plenty: An Examination of the Theoretical Implications of Waste on the Alberta Oil Sands Deposits" (2007) 45:1 Alta L Rev 227 at 237.

101 Moores, Andrews & Whitehead, *supra* note 16 at 335.

102 *Hagen v The Queen and Register of North Alberta Land Registration District*, [1954] 4 DLR 556 at 564 (Alta SC(AD) [emphasis omitted].

103 Which had reserved title to significant tranches of land during the sale of Rupert's Land to Canada: Canada, Governor in Council, *Order of Her Majesty in Council Admitting Rupert's Land and the North-Western Territory into the Union, Dated the 23rd Day of June 1870* (Windsor, 1870).

104 These railroad companies had been granted significant tranches of land, inclusive of mineral title, as compensation for railroad construction (Breen, *supra* note 76 at 5).

105 See e.g. *Alberta Natural Resources Act*, SC 1930, c 3.

Currently, approximately 81 percent of oil and gas rights in Alberta are held by the Crown, with the remaining rights held by descendants in title of the railways, the Hudson Bay Company, or homesteaders who gained title prior to 1889. The reservation of mineral rights to the Crown differs from the American experience, where homestead land typically included mineral rights.[106] This focus on individual ownership of surface and mineral rights strongly influences the American jurisprudence and commentary regarding rights to renewable resources.[107]

At common law, the holder of mineral title has a right to disturb the surface of the land in order to work and recover its minerals.[108] This right, and the relationship between holders of surface and subsurface rights generally, was brought under regulation by the *REAA* and its modern successor, the *SRA*. Essentially, the *SRA* plays a mediating role between holders of surface and mineral rights, as well as between surface holders and operators of utility infrastructure.[109] The *SRA* allows operators entitled to work subsurface minerals or to inject carbon dioxide into an underground formation[110] to apply for a right of entry order when that operator is unable to agree to terms of access and compensation with the surface landowner or occupant.[111] A right of entry order vests title in the operator of that portion of the surface of the land necessary to perform its operations.[112] Following a grant of right of entry, the Land and Property Rights Tribunal (LPRT) will hold proceedings to fix an appropriate rate of compensation for the surface taking.[113] Finally, compensation for disturbances that involve an annual compensation component, arising either from the right of entry orders or negotiated leases, are subject to a five-yearly review before the LPRT at either party's request.[114] By facilitating the right of subsurface owners to access their property from the surface, while ensuring that surface owners were compensated fairly for that access, the *SRA* and its antecedent legislation promoted the development of Alberta's oil and gas infrastructure.[115]

B. POOLING AND UNITIZATION

Pooling and unitization are legislative measures to ensure equitable sharing of benefits and costs of developing a shared exclusive resource. As a conservation measure, the *Oil and Gas Conservation Rules*,[116] enacted under the *OGCA*, prescribe drilling spacing units to limit the maximum number of wells that can be drilled in a particular pool, with each owner in the

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106 *Ibid*.

107 See e.g. *Romero v Brunell*, [2009] 603 F Supp 2d 1333; *Contra Costa Water Dist v Vaquero Farms Inc*, [1997] 68 Cal Rptr 2d 272; Alan J Alexander, "The Texas Wind Estate: Wind as a Natural Resource and a Severable Property Interest" (2011) 44:2 U Mich JL Ref 429; Robert Montgomery, "Water to Wind: The Path Texas Groundwater Law Provides to Sever the Wind Estate and Prioritize Mutually Dominant Estates" (2020) 50:1 Tex Environmental LJ 107.

108 *Alberta Energy Company Ltd v Goodwell Petroleum Corporation Ltd*, 2003 ABCA 277 at paras 51, 64 [*Goodwell Petroleum*].

109 *Supra* note 91.

110 *Ibid*, s 1(h).

111 *Ibid*, s 15.

112 *Ibid*, s 16.

113 *Ibid*, ss 23, 25. Pursuant to the *Land and Property Rights Tribunal Act*, SA 2020, c L-2.3, effective 2 June 2021, the former Surface Rights Board was amalgamated into the new Land and Property Rights Tribunal. Existing members of the Surface Rights Board continue as members of the Land and Property Rights Tribunal.

114 *SAA*, *ibid*, s 27.

115 *Ibid*.

116 *Oil and Gas Conservation Rules*, Alta Reg 151/1971 [*Conservation Rules*].

pool taking a proportionate share of the production and bearing a proportionate share of the cost.[117] This measure finds its roots in a 1938 order from the PNGCB, made in response to concern about excessive drilling in the Turner Valley field.[118] In order to prevent an over-concentration of wells drilled into the same reservoir and the resulting loss of reservoir energy,[119] the number of wells is limited, while each owner takes a proportionate share of the production.

Currently, the *OGCA* allows for compulsory pooling within a drilling spacing unit (DSU) upon the application by an owner of a tract in the DSU.[120] A compulsory pooling order "meets one of the main objectives of oil and gas conservation legislation, namely, to accord each owner the opportunity to obtain the owner's share of the oil and gas from the pool."[121] To encourage voluntary pooling, the *OGCA*, through its licencing provisions, effectively prohibits production from a pool or geological formation by separate interest holders unless a pooling agreement has been reached.[122] When a pooling order is granted, an operator is appointed for the DSU, a proportionate share of production is allocated to each tract, and payment of costs of drilling, operation, and abandonment are ordered.[123] In addition, the Alberta Energy Regulator (AER) may specify penalties applicable to an owner of a tract within the DSU who does not pay their share of the actual costs of drilling.[124]

Unlike pooling, which concerns only the production within a DSU, unitization "is the joint, coordinated operation of a petroleum reservoir by all of the owners of rights" in the reservoir.[125] In other words, the entire reservoir is produced by a single operator with each owner within the reservoir taking a proportionate share of the production and paying a proportionate share of the costs. Unit operation, or "unitization," has been proposed as a solution to the "Rule of Capture" problem since the early days of the oil and gas industry in North America.[126] Indeed, the McGillivray Commission found that "there is only one complete answer to the 'Rule of Capture' and that is unit operation."[127] By removing the incentive for each owner to produce as much as they can, as soon as they can, unitization prevents waste of the oil and gas in the reservoir. Although unitization carries with it a number of benefits, including avoiding unnecessary development and maximizing the ultimate recovery of petroleum from the field,[128] currently, the *OGCA* contemplates only voluntary unitization by the agreement of all owners within a reservoir.[129] Provisions of the

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117 *Ibid*, r 4.010.
118 Breen, *supra* note 76 at 134.
119 Such as pressure in the reservoir which allows the production of oil.
120 Tract is defined as "an area within a drilling space unit or a pool, as the case may be, within which an owner has the right or interest in the right to drill for and produce oil and gas" (*OGCA*, *supra* note 18, s 78(b)).
121 Nigel Bankes, "Compulsory Pooling under the *Oil and Gas Conservation Act* of Alberta" (1996) 35:4 Alta L Rev 945 at 950.
122 *OGCA*, *supra* note 18, ss 15(1), 16(1).
123 *Ibid*, s 80(4).
124 *Ibid*, s 80(5).
125 Jacqueline Lang Weaver & David F Asmus, "Unitizing Oil and Gas Fields around the World: A Comparative Analysis of National Laws and Private Contracts" (2006) 28:1 Hous J Intl L 3 at 6. We have modified the quote above to reflect the reality in Alberta that rights in Alberta are held in the subsurface title. The original contemplates unitization by owners of tracts "overlying the reservoir," which reflects the American view of mineral rights running with the surface of the land. Otherwise, the concept is the same.
126 See e.g. John C Jacobs, "Unit Operation of Oil and Gas Fields" (1948) 57:7 Yale LJ 1207.
127 "McGillivray Report," *supra* note 64 at 32.
128 Weaver & Asmus, *supra* note 125 at 12.
129 *Supra* note 18, s 78.

OGCA allowing for compulsory unitization were included in the *Oil and Gas Conservation Act* passed in 1957[130] and remain on the statute books in Alberta but have never been proclaimed in force.[131]

C. ROYALTIES FOR PUBLICLY OWNED RESOURCES

The royalty framework applied to oil and gas production in Alberta is not so much a feature of the conservation regime as it is a reason for it. As noted above, 81 percent of oil and gas interests in Alberta belong to the provincial Crown, with the remainder in private hands. The provincial government grants licenses to produce that oil and gas but reserves a royalty interest over any production.[132] "Resource revenue," derived primarily from royalties, contributed nearly $6 billion in revenue to the provincial budget in Alberta in 2019–2020.[133]

Royalties payable on Crown dispositions are prescribed by regulation.[134] The current royalty regime for non-oil sands projects is the Alberta "Modernized Royalty Framework,"[135] as established by the *Natural Gas Royalty Regulation, 2017*[136] and the *Petroleum Royalty Regulation, 2017*.[137] Under the *MRF*, royalty rates are calculated per well based on the "Drilling and Completion Cost Allowance" (C*).[138] The C* is a proxy for well costs, used to determine the allowable revenue after which higher royalty rates are imposed.[139] When the well's cumulative revenue is lower than its C*, the producer pays a flat royalty of 5 percent of revenue, less various deductions.[140] Once the well's cumulative revenue is equal to or higher than its C*, the producer pays a calculated royalty rate that can range from 5 percent to 40 percent for an oil well.[141] Since a well's C* is calculated based on the industry standard, rather than its actual cost, the MRF incentivizes producers to reduce their completion and drilling costs to below industry standard to capture more revenue before reaching C* and the higher royalty rates.[142]

VI. UNIQUE FEATURES OF RENEWABLE ENERGY

The *REA* defines "renewable electricity" as that which "has been produced from a renewable energy resource,"[143] and a "renewable energy resource" as one that, "occurs naturally and that can be replenished or renewed within a human lifespan."[144] This definition expressly includes, without limitation, "moving water," "wind," "heat from the earth,"

130 Bankes, *supra* note 121 at 949.
131 *Ibid*; *Oil and Gas Conservation Amendment Act*, RSA 1980, c 16 (Supp).
132 *Mines and Minerals Act*, RSA 2000, c M-17, ss 33–34 [*MMA*].
133 Alberta Treasury Board and Finance, *Budget 2021: Fiscal Plan Protecting Lives and Livelihoods, 2021–24* (Edmonton: Alberta Treasury Board and Finance, 25 February 2021) at 15.
134 *MMA*, *supra* note 132, s 36(1)(a).
135 Alberta, *Alberta Modernized Royalty Framework Guidelines: Principles and Procedures, Version 2.0*, by Katherine Clement, (1 June 2020) at 6 [*MRF*].
136 Alta Reg 211/2016.
137 Alta Reg 212/2016.
138 *Supra* note 135 at 7.
139 *Ibid*.
140 *Ibid* at 18.
141 *Ibid* at 20–21.
142 Government of Alberta, "Alberta's Modernized Royalty Framework Overview" (1 January 2017) at 1.
143 *Supra* note 7, s 1(i).
144 *Ibid*, s 1(l).

"sunlight," and "sustainable biomass."[145] These sources of electricity generation have unique features that bear upon their successful exploitation and conservation.

A. WIND

Wind presents a unique management challenge due to its reliance on variable environmental conditions. Wind generation transforms the kinetic energy of wind into electrical energy by allowing wind to pass through a turbine. The kinetic energy of wind cannot be stored directly and so must be captured and immediately converted to electrical energy. Generally speaking, the wind in Alberta blows the strongest during the night, particularly during the summer,[146] and wind generation capacity is 15–20 percent higher during the winter. Extreme hot and cold temperatures, which tend to be accompanied by still conditions, negatively impact wind generation.[147] The highest wind generation yet recorded in Alberta was in 2020.[148]

Among renewable energy resources, wind provides the highest installed generation capacity in Alberta[149] at 11 percent of all installed capacity in 2020.[150] Wind facilities have historically been concentrated in southern Alberta but have more recently expanded into the centre of the province, where they have generated the same amount of electricity per megawatt of installed capacity.[151]

B. HYDRO

At 6 percent, hydroelectric generation provides the second highest installed generation capacity in Alberta among renewable energy resources.[152] Hydro electricity is generated by passing water through turbines which may occur through "run of the river" installations or water stored behind a dam, then released.[153] Dammed hydroelectric generation differs from most other renewable energy generation in that the water providing the generative capacity may be stored and accessed as needed. The inclusion of large-scale hydroelectric generation projects within the umbrella of renewable resources has been challenged, as the relative scarcity of suitable locations for such projects and their permanent effect on the surrounding landscape bring the renewability of this form of generation into question.[154] However, "moving water" is a defined renewable energy resource under the *REA*.[155]

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145 *Ibid*.
146 "AESO 2020," *supra* note 61 at 24.
147 *Ibid* at 24.
148 *Ibid* at 23.
149 *Ibid* at 13.
150 Alberta Electric System Operator, "Electricity in Alberta," online: <www.aeso.ca/aeso/electricity-in-alberta/>.
151 "AESO 2020," *supra* note 61 at 24.
152 *Ibid* at 13.
153 Penelope Crossley, *Renewable Energy Law: An International Assessment* (Cambridge: Cambridge University Press, 2019) at 36.
154 *Ibid* at 39–41.
155 *Supra* note 7, s 1(l)(i).

C. SOLAR

Solar energy provided only 1 percent of installed capacity in Alberta in 2020,[156] but this installed capacity ballooned from 15–107 MW in 2020 as four new solar farms came online.[157] Solar energy continues to evolve as a renewable energy resource in Alberta and worldwide, where it was the fastest growing source of renewable energy capacity from 2013–2018.[158]

Solar electricity is typically produced by arrays of photovoltaic cells, which convert photons to electrical current.[159] As with wind, solar electricity generation relies on intermittent resource availability supply and generates different amounts of electricity in different seasons or times of day. As solar electricity can only be generated during the day and wind in Alberta is typically stronger at night, solar and wind can be used in a manner that complement one another.[160] Like wind, solar generation sites tend to require a large amount of land. However, where wind installations occupy relatively smaller pockets of land within the large project area, solar installations tend to occupy much more of the total project area. For comparison, the recently approved Suffield solar project occupies 72.86 hectares[161] with 23 MW in generation capacity,[162] while the Halkirk 2 Capital Power wind project was approved for 148-MW generation capacity on 45.8 hectares (after construction), spread over 45 sections.[163] Also unlike wind installations, which can coexist with agriculture, the use of land for solar projects is often incompatible with agricultural or other uses.[164]

D. GEOTHERMAL

Geothermal electricity falls within the 1 percent of "other" sources of generation capacity in Alberta.[165] A number of technologies are in use internationally to generate electricity by harnessing the thermal energy within the Earth's crust.[166] As geothermal energy may be exhaustible in specific locations, its status as a renewable has been questioned.[167]

The Government of Alberta has taken steps to promote geothermal electricity in Alberta with the *GRDA*.[168] The *GRDA* places oversight of the development of geothermal resources

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156 Alberta Electric System Operator, "Electricity in Alberta," *supra* note 150.
157 Alberta Electric System Operator, *AESO 2019 Annual Market Statistics* (March 2020) at 26, online: <www.aeso.ca/download/listedfiles/2019-Annual-Market-Statistics.pdf>; "AESO 2020," *supra* note 61 at 25.
158 Crossley, *supra* note 153 at 24.
159 *Ibid*.
160 "AESO 2020," *supra* note 61 at 26.
161 *C&B Alberta Solar Development ULC: Suffield Solar Project Amendment* (12 February 2019), Decision 24130-D01-2019 at para 7, online: AUC <www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2019/24130-D01-2019.pdf>.
162 "AESO 2020," *supra* note 61 at 25.
163 *Capital Power Generation Services Inc Halkirk 2 Wind Power Project* (11 April 2018), Decision 22563-D01-2018 at paras 3, 29, online: AUC <www.auc.ab.ca/regulatory_documents/ProceedingDocuments/2018/22563-D01-2018.pdf> [*Halkirk 2*].
164 Farmers' Advocate Office, *Renewable Energy*, *supra* note 70 at 7.
165 Alberta Electric System Operator, "Electricity in Alberta," *supra* note 150.
166 Crossley, *supra* note 153 at 43.
167 *Ibid* at 46.
168 *Supra* note 68.

with the AER.[169] It mirrors the *Responsible Energy Development Act*[170] and *OGCA*[171] in its objective of "the economic, orderly, efficient and responsible development in the public interest of geothermal resources in Alberta."[172] The *GRDA* also amends the *MMA* to allow for the payment of compensation to the Crown for the exploration and development of Crown-owned geothermal resources,[173] though regulations in this respect have not yet been developed.

E. SUMMARY

Many renewable resources are transitory in nature, and the largest and fastest growing sources of renewable generation capacity in Alberta, wind and solar, are especially so. Aside from large-scale hydroelectric projects that make use of dams, the generation capacity of renewable energy resources cannot be directly stored: if that generation capacity is not captured, it is lost. As such, and as is discussed below, an organized conservation effort to prevent waste and maximize productive generation capacity is warranted. The renewable energy extraction and generation sector has not experienced the wasteful practices that occurred in the early years of the oil and gas industry, but the risk of inefficient renewable exploitation is increasing as more of these projects develop.

VII. IS A REGULATORY REGIME GOVERNING ALL SOURCES POSSIBLE?

Although it is tempting to lump all renewable electricity together, doing so obscures critical differences between the various sources which create unique regulatory challenges for each source. Wind and solar are intermittent, which, under the current market design in Alberta, creates an incentive to price offers low enough that generators are more likely to be dispatched on when they are available. This contrasts markedly with hydro developments, particularly those which include a reservoir component, where on-demand generation is more likely to be available, subject to maintenance of necessary water levels in the associated reservoir. Similarly, although seasonal river water flows are variable and may affect the ability of run-of-river hydro developments to generate electricity, it can be expected that run-of-river hydro has a much greater availability than either wind or solar generation. Although owners of hydro generation facilities may make zero-dollar offers so that they are dispatched on, it would seem far more likely that a hydro-generator will be able to generate when the SMP is non-zero.

Further, unlike wind generating facilities, which are incented to offer such that they will be able to generate whenever wind is available, dam-based hydro facilities do not permanently lose the opportunity to generate if they are not dispatched on. Impounded water which is not used to generate electricity can simply be kept until the owner of the hydro-

169 *Ibid*.
170 *Responsible Energy Development Act*, SA 2012, c R-17.3, s 2(1)(a) [*REDA*].
171 *Supra* note 18, s 4.
172 *GRDA*, *supra* note 68, s 3(1)(a).
173 *Ibid*, s 31(5).

generating facility makes an offer into the MMO which is dispatched on or the AESO requires that unit to generate to meet a supply shortfall.[174]

Additionally, practical considerations regarding renewable sources may require different regulatory treatment. Given the necessary size and impacts of large-scale wind turbines, it would seem unlikely that there will be industrial-scale development of wind generation in built-up areas of Alberta. However, rooftop solar may become a significant source of generation in the future. Looking only at the City of Calgary, with a developed area of more than 82,000 hectares,[175] with sufficient market penetration, rooftop solar in Calgary could become, in aggregate, one of the largest (if not the largest) sources of solar generation in Alberta.

We raise the foregoing differences between renewable sources simply to point out that, when considering and implementing a renewable conservation regime, it will be necessary to account for the unique features of each renewable energy source. As in the oil and gas industry, it may also be necessary to prefer one or several renewable energy sources over others.

VIII. A RENEWABLE CONSERVATION REGIME

Considering all of the foregoing, we suggest that a renewable conservation regime should be implemented in Alberta, with the following features, each of which is discussed in more detail below:

(a) a separate "renewable right" held separately from the surface title with ultimate ownership of those rights vested in the Crown subject to lease to renewable generation facilities;

(b) compulsory unitization with respect to wind resources;

(c) rights of entry with respect to renewable rights, allowing the holder of the renewable-rights lease to obtain entry by order, if a negotiated agreement cannot be reached; and

(d) renewable royalties requiring the renewable lessee to compensate the Crown for the use of the renewable resource.

A. RENEWABLE TITLE

First, we propose that a "renewable right" be recognized, separate from surface and mineral rights, which could be leased in a similar way to current petroleum and natural gas rights. Further, we suggest the ownership of this interest should vest in the Crown with

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174 Alberta Electric System Operator, *ISO Rules* (20 December 2013), s 202.2.

175 Statistics Canada, "Census Profile, 2016 Census: Calgary, Alberta and Canada" (29 November 2017), online: <www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=4806016&Geo2=PR&Code2=01&Data=Count&SearchText=4806016&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=3>.

royalties payable to the Crown for the use of wind, solar, and other renewables. This approach is in keeping with the historic approach to the development of natural resources in Canada, which at least implicitly assumes that public benefit should flow from natural resources and addresses the potential for waste from the non-optimal distribution of wind turbines.

As noted above, Crown ownership of natural resources has long been a feature of resource development in Alberta and the rest of Canada. The recently passed *GRDA* preserves the historical division between mineral and surface title by confirming that the existing owner of mineral title has the right to explore the geothermal resources associated with that mineral title.[176]

Further, in passing the *Carbon Capture and Storage Statutes Amendment Act, 2010*, Alberta declared itself vested of "the pore space below the surface of all land in Alberta" for the purpose of carbon capture and sequestration.[177] Notably, this subsurface pore space was retroactively reserved from any previous grant of subsurface mineral rights,[178] thus giving the Crown the exclusive right to develop pore space for carbon capture and sequestration or lease that right to others. Similarly, the *Water Act*,[179] another statute with an explicit "conservation" goal,[180] vests "[t]he property in and the right to the diversion and use of all water in the Province … in Her Majesty in right of Alberta,"[181] with licensing those rights for value at the Crown's discretion. Accordingly, a new renewable right is in line with Alberta's historical treatment of its natural resources, including existing schemes for geothermal and water rights.

Furthermore, the provincial governments of British Columbia, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia have all adopted wind energy rights leasing systems to promote wind energy developments on public lands.[182] In Ontario, an application for the use of Crown land for a wind project is made, and following approval of the application, land tenure documents are issued with rents payable to the Crown.[183] Similarly, in Saskatchewan, applications for wind power leases are made to the Ministry of Agriculture, and following the grant of a wind power lease, the wind power lessee pays rent to the Crown,[184] and a similar system has been adopted in British Columbia.[185] The adoption of a similar system in Alberta would be consistent with the practice in Canada.

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176 *Supra* note 68, s 31(6).
177 SA 2010, c 14, s 15(1)(l)(b) [*CCSSAA*].
178 *Ibid*, s 2.
179 RSA 2000, c W-3.
180 See e.g. *OGCA*, *supra* note 18, which has a long history beginning with the *North-west Irrigation Act*, SC 1894, c 30, as am by SC 1895, c 33 and disputes over the fair allocation of water.
181 *Water Act*, *supra* note 179, s 3(2).
182 Allan Ingelson, "Wind Energy Development on Public Lands in Alberta: A Missed Opportunity" (14 June 2018), online (blog): <ablawg.ca/2018/06/14/wind-energy-development-on-public-lands-in-alberta-a-missed-opportunity/comment-page-1/>.
183 Government of Ontario, Renewable Energy Program, "Onshore Wind Power Development on Crown Land Procedure" (5 July 2010).
184 Government of Saskatchewan, "Wind Power Policy: Agricultural Crown Land" (February 2018).
185 Government of British Columbia, "Land Use: Wind Power," online: <www2.gov.bc.ca/gov/content/industry/crown-land-water/crown-land/crown-land-uses/clean-energy/wind-power>.

Crown ownership of the renewable right has the advantage of encouraging the development of renewable projects while providing a revenue stream for the Crown. As noted above, a potential obstacle to maximizing the use of Alberta's renewable resource arises from the disconnect between the boundaries of the surface title and the available wind resources, such that a reluctant surface owner could prevent the optimal development of renewable resources by refusing to lease land for the project. A separate renewable right, leased from the Crown, would provide project proponents with the ability to assemble sufficiently large parcels so that wind turbines could be optimally sited to maximize the amount of electricity generated and thereby minimize waste. This outcome is contingent on the licensee of the renewable right having the right to access the surface of the land to make good on that right, as discussed below. Vesting the renewable right in the Crown additionally allows for greater regulatory oversight, as the Crown could see to it that licensees develop their renewable resources promptly and efficiently, as is the case in the oil and gas context.[186]

The notion of the split title above the surface is not foreign to Canadian law — air space parcels and volumetric strata space are already titled, severable interests in land in many Canadian jurisdictions.[187] A separate renewable right would create an additional severable usufructuary right in renewable energy resources that may be captured.

We note that commentary from the US, although supportive of a separate wind estate, suggests that the renewable right should vest in the owner of the surface title.[188] However, such an approach would simply preserve the status quo. Although there is no formal recognition of a renewable right, currently in Alberta surface rights holders have de facto control over development through their control over access to the land and their ownership over air rights. Simple confirming the de facto situation would do nothing to address the potential sub-optimal development of renewable resources in Alberta.

In addition, Crown ownership of renewable rights could incent development through a scheme similar to the validation provisions of Crown petroleum and natural gas licenses. That is, unless the licensee of the renewable right took steps to validate the license through exploration or production, the right would revert to the Crown.[189] As matters currently stand with respect to wind and solar resources, other than foregone rent from a renewable installation, there is no specific incentive for the de facto holder of the renewable right to develop the renewable resources on their land.

We recognize that creating a renewable right, vested in the Crown, may raise some opposition, particularly on the basis of private property rights. We note that debate on the passage of the *CCSSAA* specifically raised this opposition.[190] However, the rights of surface owners have been balanced, more or less successfully, with lessees of petroleum and natural gas rights for more than 70 years in Alberta. Wind turbines, at least, are similar to oil and gas wells, in that they both occupy a limited amount of surface area once erected. As discussed

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186 *Petroleum and Natural Gas Tenure Regulation*, Alta Reg 263/1997, ss 5–13.

187 See e.g. *Land Title Act*, RSBC 1996, c 250, ss 138–46; *Land Titles Act, 2015*, SY 2015, c 10, ss 79–82; *Land Titles Act*, RSA 2000, c L-4, s 86; *The Real Property Act*, CCSM, c R30, ss 131–33; *Air Space Act*, RSNB 2011, c 109.

188 Alexander, *supra* note 107 at 435.

189 *Petroleum and Natural Gas Tenure Regulation*, *supra* note 186, ss 5–18.

190 Alberta, Legislative Assembly, *Hansard*, 27th Leg, 3rd Sess, No 51e (1 December 2010) at 1772.

above, while a typical wind farm will consist of dozens of turbines, in contrast to an oil and gas well, these will typically be spread out over a large area of land.[191]

We also expect that there will need to be differential treatment of renewable rights with respect to wind and solar, given the differing impacts on the surface owner from the development of these renewable resources. As noted above, wind installations are generally compatible with other agricultural uses with some limitations, such as limiting the use of aerial spraying.[192] In addition, although wind generating facilities tend to cover large land area, the most severe impacts on land uses are in the areas immediately surrounding the installed turbines and associated facilities. Conversely, solar installations are incompatible with most other agricultural uses, other than limited uses for grazing animals,[193] and occupy essentially all of the land taken up for the installation.

The impact of a solar installation on agricultural operations will be much greater than a wind installation on a similarly sized parcel. Importantly, agriculture remains a significant part of Alberta's economy, contributing $9.2 billion in real GDP in 2019.[194] If significant agricultural land is taken up for solar generation, this may have a negative impact on the agriculture industry in Alberta. However, there may be non-agricultural uses that are complementary to solar development, such as low-density industrial developments with extensive flat roof areas.

To address these issues, it may be necessary to limit the circumstances in which a "solar right" can be developed; for example, by limiting the lease of solar rights to existing brownfield sites which are unsuitable for agricultural production. Moreover, with respect to rooftop solar installations in urban areas and in particular residential solar installations, the implementation of a leasing scheme, including lease payments, may be overly burdensome to the point that they become an obstacle to further renewable development.

B. RIGHTS OF ENTRY

In order to facilitate the development of reviewable rights licenced from the Crown, as discussed above, we suggest that the renewable rights should be coupled with the ability for the right holder to seek and obtain rights of entry pursuant to the *SRA*. As is the case with mineral title, the reservation to the Crown and subsequent licensing of a renewable right should include a right to "that without which the thing [granted] would be of no effect,"[195] namely, the right to access and develop the surface of the land to the extent necessary to gather the licensed renewable energy. Any such reservation and licensing scheme would be relatively ineffectual if this were not the case. This access right is best granted and administered by the LPRT under the existing *SRA* the framework.[196]

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191 To use the *Halkirk* 2 project as an example, 74 structures would be distributed across 45 sections of land (*supra* note 163 at para 3).
192 Farmers' Advocate Office, *Renewable Energy*, *supra* note 70 at 12.
193 *Ibid* at 7.
194 Government of Alberta, Alberta Agriculture and Forestry, "2019 Agriculture Statistics Factsheet" (June 2020) at 1.
195 *Goodwell Petroleum*, *supra* note 108 at para 51.
196 *Supra* note 91.

We note that the *GRDA* allows for the creation of regulations regarding surface access for the development of geothermal resources.[197] This is not surprising, given that the right to explore for geothermal resources is linked with the mineral rights. Similarly, the *CCSSAA* amended the *SRA* to allow for rights of entry for the purposes of carbon capture and sequestration.[198] Rights of entry for renewable rights can therefore be seen as an evolution of the existing scheme rather than a wholesale change to the regulatory regime.[199]

In addition to addressing the land access issue highlighted above, bringing renewable rights under the *SRA* scheme will have benefits for surface rights holders as well. Currently, there are no specific protections for landowners who choose to negotiate leases with renewable project proponents, which, in some circumstances, appears to have had negative consequences for landowners.[200] As others have suggested, requiring renewable project proponents to use licenced land agents in negotiations may provide valuable protection for surface rights holders.[201] Under the *SRA* scheme, surface owners will also benefit from access to a cost-effective means of determining compensation,[202] a convenient forum for dispute resolution,[203] and a mechanism for periodic review of annual compensation.[204] If requested by either party, the LPRT will hold a hearing to fix an appropriate rate of annual compensation, which is typically determined with reference to the "pattern of dealings" of negotiated agreements between surface owners and operators in the area.[205] This methodology ensures that surface owners are compensated in an equitable manner, addressing the barrier to the development of renewable reasons from inequitable distribution of benefits.

Further, a right of entry scheme will provide both cost and development predictability for renewable project developers. That is, renewable project developers will have the comfort that, upon obtaining rights to the renewable resource, they will be able to gain access to the land required to construct the development, while the jurisprudence from the former Surface Rights Board will allow renewable project proponents to predict their land costs with a reasonable degree of certainty.

Finally, particularly with respect to wind projects, the right of entry scheme could potentially address concerns about noise impacts from renewable projects. Noise impacts from wind turbines have been identified as one of several obstacles to the acceptance of wind facilities in Alberta.[206] Among other things, the *SRA* allows the LPRT to consider the adverse effects of hosting a facility, including noise impacts.[207] This would not displace the noise

197 *GRDA*, *supra* note 68, s 27.
198 *CCSSAA*, *supra* note 177, s 5(4).
199 This is particularly so if the objective of achieving renewable energy targets is seen as a priority.
200 Tony Seskus, "Alberta Urged to Require Licensed Land Agents as Wind and Solar Boom Takes Off," *CBC News* (31 January 2018), online: <www.cbc.ca/news/business/solar-wind-energy-land-negotiations-alberta-1.4505394 >.
201 *Ibid*.
202 *SRA*, *supra* note 91, ss 23, 25.
203 *Ibid*, s 30
204 *Ibid*, s 27.
205 *Imperial Oil Resources Ltd v 826167 Alberta Inc*, 2007 ABCA 131 at para 22.
206 Patel et al, *supra* note 14 at 37.
207 *SRA*, *supra* note 91, ss 25(1)(d).

requirements under AUC *Rule 012*,[208] but addressing noise issues through the *SRA* scheme may result in greater acceptance of renewable projects in Alberta.

We acknowledge that this proposal to extend *SRA* rights of entry to renewable right holders fits more comfortably with wind generation than with solar. Wind turbines, although tall, create a surface disturbance that is similar to that caused by an oil well or transmission tower.[209] On the other hand, a solar facility occupies and sterilizes a large surface area.[210] This issue may be best addressed at the licensing stage, wherein licensing of solar "renewable rights" may only be granted in certain situations, such as for brownfield or rooftop developments.

C. UNITIZATION OF RESOURCES

Along with a separately titled renewable right and compulsory rights of entry, a form of unitization should be implemented to mitigate the effects of the issues we have identified above. Further, compulsory unitization should be implemented, regardless of whether the separately titled renewable right we have suggested above is implemented, in order to maximize the development of Alberta's renewable resources.

As noted above, a key constraint on the development of wind resources arises from the application of the PSL at the permit and licencing stage, such that some operators have been required to curtail to meet the applicable PSL. Operators who cannot curtail neighbouring facilities, whether by contract with the neighbouring operator or their own ownership, may not be able to proceed with their project. Put another way, an operator obtaining rights to the resource (whether by lease of the surface or a right of entry) is deprived of the opportunity to obtain their proportionate share of the resource. Unlike oil or gas, the neighbouring operators do not obtain the benefit of production from the neighbouring parcel, but the wind resources are wasted because they are left un-produced.

By unitizing production within "wind reservoirs," maximum development of Alberta's wind resources can be achieved. Although early entrants into the reservoir may experience some curtailment to allow all operators to generate while meeting the applicable PSL, the overall level of generation from renewables would likely be increased. Besides, under a unitization scheme in which each operator obtains a proportionate share of the revenue generated from the wind reservoir, the loss of revenue from curtailment would be at least partially (and potentially fully) offset by the increase in total generation.

Further, unitization may present an opportunity to address the pricing/offer issue identified above, under which the SMP is driven down by the dispatching on of all available wind capacity when wind resources are available. This is essentially a "race to capture" problem, in which operators are incented to generate as much as they can when wind is available, lest they lose out on an opportunity. As in the early days of Alberta's oil and gas industry, when the McGillivray Commission recommended unitization as the solution to the rule of

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208 Farmers' Advocate Office, *Renewable Energy*, *supra* note 70 at 7.
209 *Ibid* at 7.
210 *Ibid*.

capture,[211] unitization may solve a similar problem with respect to renewables. For example, the "reservoir operator" could make an offer on behalf of the unit, which may result in a less depressive effect on the SMP. Alternatively, it may be that the unit operator can determine the optimal combination of turbines for specific wind conditions to maximize the total amount of generation, without the need for all turbines to run; with fewer turbines offering into the market, this may reduce the depressive effect of the simultaneous activation of all wind turbines in a pool.

If the system proposed above were to be implemented, amendments to the *Fair, Efficient and Open Competition Regulation* would likely be necessary.[212] For example, a unit operator offering less than the full capacity from each generating unit within the wind reservoir may offend the prohibition on "not offering to the power pool all electric energy from a generating unit that is capable of operating."[213] However, if the net result of unit operation is increased development of wind resources in Alberta, this would be a net-positive result.

As noted above, in some instances, wind operators have resolved issues with respect to the PSL through voluntary agreements.[214] This should be permitted to continue, in line with the unitization provisions currently in the *OGCA*.[215] However, it seems that compulsory unitization is necessary to mitigate the possibility that early entrants may use their position to prevent further development within the reservoir and should form part of a renewable conservation regime.

D. RENEWABLE ROYALTIES

Finally, we suggest that, in association with the renewable rights proposed above, a royalty scheme similar in principle to that currently in place with respect to petroleum and natural gas in Alberta should be implemented. Currently, renewables in Alberta only provide revenue to the Crown as taxes on earned revenue. This is unlike oil, gas, and other hydrocarbons, which generate revenue for the Crown twice when they are used for the generation of electricity: once upon extraction, as a royalty, and then again as a tax on revenue upon being burnt and generating electricity. The extractive and generative steps are much closer together with renewables, but in theory, there are still two separate events. This presents an opportunity for the Crown to develop an additional revenue stream by taking royalties upon the capture of renewables.

Implementation of a royalty scheme in Alberta would be in line with existing practices in Canada and around the world. China, several US states, and several provinces in Canada charge royalties on electricity generation.[216] With respect to hydro developments, Brazil and Ontario charge royalties on the revenue from hydroelectric sites, while other jurisdictions charge royalties at a fixed rate per unit water used; this method recognizes the value of water

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211 "McGillivray Report," *supra* note 64 at 32.
212 Alta Reg 159/2009.
213 *Ibid*, s 2(g).
214 *Heritage Decision*, *supra* note 29 at para 10.
215 *Supra* note 18, ss 78–90.
216 Pierre-Olivier Pineau, Lucile Tranchecoste & Yenny Vega-Cárdenas, "Hydropower Royalties: A Comparative Analysis of Major Producing Countries (China, Brazil, Canada and the United States)" (2017) 9:4 Water Economics & Policy 287 at 289.

but is not linked to the project profitability.[217] With respect to geothermal developments, in the US, geothermal projects on federal land are subject to a royalty calculated on the gross proceeds of electricity sales,[218] geothermal developments on state land in California and Washington and in Australia are charged royalties on gross revenue.[219] Alberta's recently passed *GRDA* allows for the payment of royalties on geothermal energy, but the detailed scheme has yet to be developed. Wind royalties are collected by landowners under private contracts in some of the US; in Louisiana, the state can collect royalties on state wind leases, based on the lessee's gross revenue.[220]

Like the current oil and gas royalty scheme in Alberta, we suggest that a renewable royalty scheme should include a reduced royalty rate until after the initial development costs are recovered to encourage investment in renewables. Unlike oil and gas, renewable resources are not used up as they are captured, so the post-payout/higher-royalty period is potentially very long, even if the capital costs of replacement or refurbishment of renewable generating infrastructure are accounted for. It may be, for example, that the expected future value of replacement of wind turbines or photovoltaic panels could be included in an initial "Renewable Completion Allowance," similar to the C* applicable to non-oil sands projects, allowing for an almost perpetual post-payout/higher royalty period.

Finally, the implementation of a royalty regime may increase public acceptance of renewable projects. One of the barriers to the acceptance of wind energy, in particular, arises from the unequal distribution of the benefits from wind development;[221] if renewables are seen to be providing a benefit to the public, this may reduce opposition to renewable energy development and allow for additional development of Alberta's renewable energy resources.

IX. CONCLUSION

In the words of the McGillivray Commission, "it has seemed to us necessary to have regard to the past in order to intelligently examine into the present."[222] The oil and gas experience in Alberta demonstrates that regulatory intervention can succeed in building an economic and efficient industry for the energy. By building a framework based on past successes for the development of its renewable energy resources, Alberta can smooth the transition to a low-carbon future.

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217 *Ibid*.

218 British Columbia Ministry of Energy Mines and Petroleum Resources, "Intentions Paper: Geothermal Royalty Policy Proposal" (2018) at 3.

219 *Ibid*.

220 Sarah Y Dicharry, "Wind Energy Production Compensation Scheme: Oil-Like Royalties or Oyster-Like Rent" (2012) 58:1 Loy L Rev 179 at 197–98.

221 Patel et al, *supra* note 14 at 4.

222 "McGillivray Report," *supra* note 64 at 27.

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