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Solar Rights and Renewable Energy in Alberta

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CIRL Occasional Paper #31

July 2010

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Printed in Canada

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Acknowledgements

This report was prepared as part of a research project on Legal and Policy Issues with Respect to Renewable Energy and Energy Efficiency in Alberta, funded by the Alberta Law Foundation. The generous support of the Foundation is gratefully acknowledged.

1.0. Introduction

In 2008 the Government of Alberta introduced a strategy to address the challenge of climate change.[1] One of the measures in the strategy envisages greening of energy production through the introduction of more sustainable ways of its production and simultaneous increase in the use of renewable sources of energy. Renewable sources of energy include, but are not limited to, such natural phenomena as the sun, wind, and tides.

This paper focuses on solar energy for a number of reasons. Firstly, it is one of the most versatile and arguably the cleanest of all the renewable energy sources.[2] Secondly, Alberta enjoys considerable solar potential compared to many other jurisdictions. Finally, the use of this abundant resource can help to achieve the goal of greening energy production by reducing greenhouse gas emissions, thus promoting the objectives set out in Alberta's 2008 Climate Change Strategy.

The finite nature of fossil fuels is one of the reasons prompting governments to consider renewable sources of energy and their integration into the energy mix. Greening energy production by increasing the percentage of renewable energy sources, such as solar energy, requires a discussion of such issues as how one should balance competing solar rights and how these rights should be reflected in the regulatory framework.[3] Currently, no separate regulatory framework for renewable sources of energy exists in Alberta, although differential treatment in some cases is envisaged.[4]

Scarcity is the main reason why allocation of any resource, be it sunlight or any other, remains a live issue. Since the Earth is roughly spherical, sunlight hits the ground at various angles, which can range from 0 to 90 degrees. In northern latitudes greater scarcity of solar radiation stems from the longer period of time necessary for the sunlight to travel, because the angles at which sunlight reaches the surface are more acute. Because sunlight does not make contact with the ground in a directly vertical fashion in Alberta, it usually crosses one or more properties before it makes contact with the surface (excepting situations involving major landowners). The potential for conflict exists when

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[1] Alberta Environment, online: Government of Alberta <http://environment.gov.ab.ca/info/library/7894.pdf> (*Climate Change Strategy*).

[2] Solar energy is a cleaner source of energy than wind power because it generates less noise emissions.

[3] A "solar right" can be defined as a "legally enforceable right to a reasonable proportion of the natural, unobstructed flow of direct solar radiation to a solar collector." Ontario, Ministry of Energy, *Perspectives on Access to Sunlight* (Toronto: Ministry of Energy, 1978) at 2. The analysis of implications of solar rights for reflected sunlight and what constitutes "reasonable proportion" are beyond the scope of this paper.

[4] The *Micro-Generation Regulation*, Alta. Reg. 27/2008, establishes special rules for micro-generators of solar electricity, among other renewable energy sources, whose capacity does not exceed 1 megawatt (MW).

the amount of solar radiation received by one property is reduced through shading created by structures or vegetation on another property.

The mechanism of legal rights provides one way of addressing the issue of scarcity and regulation of conflicts associated with it in an organized society. Whether creation of rights, and property rights in particular, is the best way of dealing with this issue is debatable.

This paper is organized as follows. Section 2 describes possible uses of solar energy and provides several examples of how legal problems can arise when solar technologies are employed. Section 3 outlines characteristics of solar radiation in Alberta and assesses its solar potential. Section 4 reviews federal and provincial policy initiatives designed to promote greater use of solar energy in Canada and in Alberta. The legal protection mechanisms presently available to users of solar technologies in Alberta are presented in Section 5, and the adequacy of those mechanisms is analyzed in Section 6. The mechanisms of legal protection used in other jurisdictions are examined in Section 7. Section 8 contains some concluding remarks.

2.0. What Is Solar Power For?

Before one can address the adequacy of legal protection mechanisms available to users of solar technologies in Alberta, it is necessary to establish what solar energy is and how it can be used. Solar power is derived from the sun's rays (or solar radiation) and can be used for a variety of purposes. Solar radiation is used directly when solar energy is transformed into usable heat. Indirect use occurs when solar radiation is transformed into electricity by means of solar photovoltaic technology and then used for heating or cooling purposes.[5] Indirect use also takes place when solar radiation is used for chemical applications to produce fuels and chemicals.

2.1. Direct Use

Two categories of direct use of solar thermal energy should be distinguished: passive and active. Passive use entails virtually immediate incorporation and/or transfer of heat into the energy mix for consumption. Active use requires collection of heat before it is

[5] There is thus an overlap between direct and indirect use of solar power, as heat can be derived both directly, from exposure to solar radiation and indirectly, from electricity produced through solar technology. C. Philibert, Barriers to Technology Diffusion: the Case of Solar Thermal Technologies, online: Organisation for Economic Cooperation and Development <http://www.oecd.org/dataoecd/46/14/37671704.pdf> at 7.

incorporated and/or transferred into the energy mix for consumption. Each of these categories is considered below.

2.1.1. Passive Use

Passive use of solar thermal energy is often associated with architecture and design of buildings and refers to such uses as heating of water or space, lighting, and ventilation. Some of the examples of passive solar heating include "sun-facing glazing, double-façade wall construction, air-flow windows, thermally massive walls behind glazing, or preheating of ventilation air through buried pipes."[6]

When used for lighting purposes, sunlight can be directed deep into a building.[7] Spectrally selective windows can maximize lighting, thus decreasing cooling requirements.[8] Electro-chromatic windows can be switched from a clear to a tinted state, thus minimizing winter heating requirements and summer cooling needs.[9] As for ventilation, the building façade can be used to generate and channel airflows, thus exploiting differences in ambient and interior temperatures of various parts of the building and accordingly removing or adding heat when the sun shines.[10]

Passive solar heating is not limited to design or refurbishment of individual buildings. It can also extend to buildings' surroundings and spatial organization of such buildings. The former entails the use of vegetation, fountains and other devices permitting to regulate temperature and increasing or minimizing heating or cooling requirements.[11] The latter, also known as urbanism, creates heat island effects that reduce winter heat loads and increase summer cooling work loads.[12]

The use of passive solar energy is usually considered from the demand side and is not typically reflected in energy statistics because of the considerable expenditure required to examine buildings.[13] As a result, the potential of the passive solar energy use is largely overlooked or discounted. According to one estimate, between 50 and 75 per cent of the energy needs of new buildings constructed under normal practice can be either eliminated

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[6] *Ibid.* at 9.

[7] *Ibid*.

[8] *Ibid*.

[9] *Ibid*.

[10] *Ibid*.

[11] *Ibid*.

[12] *Ibid*. at 10.

[13] *Ibid*. at 9.

or satisfied through passive solar energy, while reductions in energy consumption in already existing buildings will be less significant.[14]

2.1.2. Active Use

Active use of solar thermal energy entails collection of this energy before its delivery for consumption for heating or cooling purposes. Active solar technologies, which typically include unglazed, glazed flat plate and evacuated tubes collectors, can supply heat for domestic hot water and/or buildings.[15] The vast majority of solar thermal collectors are used to heat water domestically.[16]

When solar thermal energy is used for cooling and dehumidification, cooling technologies, such as single- and double-effect absorption chillers, adsorption chillers, and solid or liquid desiccant systems, are used.[17] Similarly to the passive use of solar thermal energy, the active use of solar thermal energy permits the creation of "islands" where it is used for heating and cooling purposes and which is combined with some form of thermal energy.[18] In Denmark, for example, a solar-assisted district heating system can encompass 1,300 houses, a 70,000 m^3 gravel-pit for storage, and a 30 per cent solar fraction.[19]

Bi-directional use of solar thermal energy can be achieved with the assistance of heat pumps, which are usually run on electricity and can transfer heat from a cold medium to a warmer medium or vice versa.[20] Thus, when the weather is cold, heat pumps can be used for heating purposes as outside air or seawater is transformed into the warm air or hot water to distribute heat in a building; when the weather is hot, heat pumps can transfer heat from a hot to a cold medium, thus cooling water or air.[21]

2.2. Indirect Use

Solar radiation can be used indirectly when it is transformed into electricity by means of solar photovoltaic technology and then employed for heating or cooling purposes.

[14] *Ibid.*

[15] *Ibid.* at 10.

[16] *Ibid.* at 12.

[17] *Ibid.*

[18] *Ibid.* at 11.

[19] *Ibid.*

[20] *Ibid.*

[21] *Ibid*.

Indirect use also occurs when solar radiation is used for chemical reactions to produce fuels and chemicals.

2.2.1. Photovoltaics

The term "photovoltaics" refers to devices which directly convert sunlight into electricity.[22] Photovoltaics can function as autonomous systems or form part of integrated systems such as building- or network-integrated (with other sources of electricity generation) ones. Electricity produced with photovoltaic technology can be directly consumed by stand-alone systems or it can be supplied to the grid before it is consumed. More than 90 per cent of photovoltaic systems worldwide are implemented as grid-connected ones.[23]

Solar cells, made of semiconductor materials, are the building blocks of photovoltaic technology because they transfer the energy to charge carriers when photons of light fall on the cell.[24] Several types of solar cells exist. Wafer-based crystalline silicon cells are the most prevalent due to their superior performance.[25] Solar cells based on thin-films compete with wafer-based ones.[26] The main attraction of the former stems from the fact that they require less semiconducting material and can be manufactured at lower cost per watt, although they are not as efficient as wafer-based cells.[27]

The cost of solar electricity varies directly with the cost of the raw material used to manufacture solar cells and the low density of energy obtained from photovoltaic collectors.[28] According to a widely accepted view in the photovoltaic community, photovoltaic competitiveness can be achieved by using thinner silicon wafers and higher conversion efficiencies.[29] In other words, it is necessary to use less of the most expensive element in the photovoltaic system — i.e. the semiconductor material — and increase the low conversion efficiency of solar radiation.[30] Two solutions address these difficulties,

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[22] European Commission, Photovoltaic Solar Energy, online: European Commission <http://ec.europa.eu/energy/publications/doc/2009_report-solar-energy.pdf>.

[23] *Ibid*.

[24] *Ibid*.

[25] More than 90 per cent of solar cells made consist of wafer-based silicon. *Ibid*.

[26] Thin films are deposited directly onto large area substrates, such as glass panels or long foils. *Ibid*.

[27] *Ibid*.

[28] *Ibid*.

[29] *Ibid*.

[30] *Ibid*.

respectively: concentrating photovoltaics and cogeneration.[31] The former reduces the area of the module surface (the area of expensive solar cells), whereas the latter is directed at collecting the energy generated in the cells in addition to the electrical energy.[32]

The combination of concentrating photovoltaics and cogeneration results in an innovative third solution, i.e. CPVT/Thermal technology. The main advantage of such systems is their capability of simultaneously producing electricity, air conditioning, and heat.[33] Under this technology, the location of such collectors is a key factor in feasibility, as such systems should be as close as possible to the end user.[34] Since such collectors are relatively small, they are simple to integrate into an urban environment, whether as rooftop installations or as freestanding tracking parabolic dishes.[35]

Concentrating photovoltaics entails substituting the solar cells for concentrators, which lead the radiation received on a cell or a surface of cells, thus reducing the area of photovoltaic cells by boosting optical concentration.[36] The optimal performance requires maximization of exposure to solar radiation by means of tracking the collectors' position vis-à-vis the sun. Concentration ratios are not without limits, however. These limits, which affect the efficiency of photovoltaic modules, are imposed by the following constraints: mirrors' reflectivity,[37] temperature,[38] diffuse radiation,[39] and string resistance.[40] Three mechanisms are frequently used for concentrating photovoltaics: parabolic troughs,[41] solar towers,[42] and dish/engine systems.[43] Concentrating solar power

[31] *Ibid*.

[32] *Ibid*.

[33] *Ibid*.

[34] *Ibid*.

[35] *Ibid*.

[36] *Ibid*.

[37] Mirrors do not reflect all solar radiation; reflectivity is largely dependent on the incident radiation wavelength and is highly reduced for shorter wavelengths. *Ibid*.

[38] The increase in temperature of solar radiation leads to losses in efficiency of photovoltaic modules; wind speed affects the temperature as well. *Ibid*.

[39] Solar radiation can be limited due to clouds or fog. *Ibid*.

[40] The metal net, contacts, and the resistance of the semiconductor material lead to internal (or string resistance) of solar cells and raise the temperature of photovoltaic modules, thus creating a threshold of irradiance beyond which the losses in string resistance increase and imposing limits in order to protect the integrity of photovoltaic modules. *Ibid*.

[41] Parabolic trough systems consist of a receiver, mirrors, and turbine technology. Trough-shaped mirror reflectors, which track the sun continuously, concentrate sunlight onto a receiver tube located in the focal line of the collector. The receiver contains a liquid such as water or oil, although molten salt can be used as well for storage. Solar radiation warms up this heat transferring liquid which is then conducted

technologies (CSP) makes solar power dispatchable, i.e. CSP transform it into a more valuable source of energy because it becomes possible to control when electricity can be produced.[44]

2.2.2. Chemical Applications

Another illustration of indirect use of solar radiation is the use of concentrated solar radiation for chemical applications. Many industrial chemical reactions require energy to start and maintain them, and solar energy can play a role in several of such processes.[45]

2.3. Legal Challenges Arising from the Use of Solar Energy

The discussion above illustrates a wide range of uses of solar radiation both for industrial and residential purposes. But what is the connection between these uses and legal rights? Several examples below demonstrate how legal problems can arise when solar technologies are used.

Example 1

A homeowner of several hectares buys solar energy systems to install both on the roof of his house to generate heat and elsewhere on the property to generate electricity for household purposes. The landscape of the property is such that the system to generate electricity has to be located near the adjoining property to attain the best output. The

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along a heat exchanger in which steam is produced, which then generates power in the turbines. European Commission, Concentrating Solar Power, online: European Commission <http://ec.europa.eu/energy/renewables/studies/doc/csp/2007_concentrating_solar_power.pdf>.

[42] Solar tower systems consist of a receiver, mirrors (heliostats), and steam generation and storage systems. A central receiver is placed on top of a tower which is surrounded by heliostats. Heliostats concentrate solar radiation by following the sun in the sky and then redirecting sunlight onto the receiver. The number of heliostats varies depending on the receiver's thermal cycle and the heliostat design. *Ibid*.

[43] Parabolic dish-shaped reflectors capture solar radiation and transfer it to an engine which uses external heat sources to expand and contract a fluid placed in the focus of the dish. This system is particularly suitable for decentralized electricity generation. *Ibid*.

[44] This ability to control electricity generation permits one to distinguish between intermittent and variable sources of energy. Coal, natural gas, and nuclear are some of the illustrations of the former, whereas wind and tides are some of the examples of the latter. Godfrey Boyle, ed., *Renewable Electricity and the Grid: The Challenge of Variability* (London: Earthscan, 2007) at 56.

[45] Some examples include production of pure zinc from zinc oxide using carbon as a reducing agent, production of hydrogen by decomposing water and regenerating the used catalyst, production of hydrogen and carbon black by decomposing natural gas, and reforming methane-rich gas into synthesized gas useable in a gas turbine. *Supra* note 41.

installation is successfully completed with the neighbour's consent. Some time later the neighbour sells her property and a new neighbour decides to build a guest house near the border and plant several mature trees nearby which would undoubtedly block the sunlight and reduce the output of the already installed solar technologies.

Example 2

A landlord of an office tower downtown decides to take advantage of government tax credits and grants for refurbishing buildings and making them more energy efficient. The landlord installs several solar systems on the roof and exterior walls of the building. Shortly after completing the renovation he learns of the upcoming construction of a new business complex nearby consisting of several much taller towers which would block sunlight from noon onwards, thus reducing exposure to sunlight in the afternoon. As a result of the preliminary construction work, which has already begun, an advertising sign was relocated and now casts a shadow on the roof of the landlord's tower. Additionally, the installed tower cranes on the future building site routinely pass through the air space above the landlord's tower.

Example 3

A future homeowner wants the subdivision developer to build a new house with a solar water heater. The developer refuses because it would amount to a violation of a municipal bylaw which prescribes specific architectural requirements for the exterior of new homes in the subdivision.

Example 4

The owner of a condominium wants to install a solar system on the roof of his property. The condominium association rejects his application because the installation might damage the roof, and such damage is not covered by the condominium insurance policy.

These examples demonstrate that access to sunlight is a live issue that can arise in a variety of settings. The issue of solar rights in Alberta's case is not of a purely hypothetical nature but has important practical implications, especially if the goal of greening energy production aspired to in the Alberta's 2008 Climate Change Strategy is to be achieved. Alberta's solar potential makes it feasible to achieve any of the above applications; the following section addresses in more detail the scope of Alberta's solar potential.

3.0. Solar Radiation in Alberta

Alberta is in a favourable position to utilize solar power compared to many other jurisdictions because in the absence of heat storage the best conditions are usually found

in the mountains, where sunshine combines with cold outdoor temperatures.[46] This assessment may seem counterintuitive, but generally "[i]n warm and sunny places output of solar systems is bigger but largely wasted as heating loads are small and the cold season short. In colder areas a lower output is better used as heating loads are higher and the cold season longer."[47] Some of the salient features that characterize solar radiation in Alberta include:

- it is a recurring natural phenomenon;
- it is dilute;[48]
- it is unevenly distributed geographically;[49]
- it can be considered intermittent;[50]
- it depends on the season, weather, time of day, and landscape; and
- peak output typically occurs in the middle of the day.

Alberta's potential in terms of indirect use of solar energy is noteworthy, as the ranking of the yearly photovoltaic potential prepared by Natural Resources Canada clearly demonstrates.[51] The first table below shows Alberta's photovoltaic potential on the national scale.

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[46] Philibert, *supra* note 5 at 17.

[47] *Ibid.*

[48] The density of solar radiation reaching the Earth is sufficient for heating systems but not for an efficient thermodynamic cycle to produce electricity. The density can be affected by clouds, fog, dust, or pollution (such as smoke from fires, industrial emissions, or volcanoes). *Supra* note 41.

[49] According to the Alberta Electric System Operator, Alberta enjoys 1,900 hours of sunshine in the northern part of the province and 2,300 in the southern part. AESO Long-Term Transmission Plan 2009, online: Alberta Electric System Operator <http://www.aeso.ca/downloads/Long-term_Plan_bookmarked_Final.pdf> at 246.

[50] The Oxford Dictionary defines the term "intermittent" as something that ceases for a time, occurs at intervals, and is not continuous. *Shorter Oxford English Dictionary*, 6th ed., *s.v.* "intermittent". Solar power is an intermittent source if one considers that solar radiation is available only when the sun is shining. Solar power can be stored, however. If this stored power is then discharged by the storage system after sunset, then solar power ceases to be an intermittent source of energy. One installation in Spain, which consists of a 15 MW solar tower with molten salts storage, can store solar radiation for 15 hours. Alternatively, solar energy can be combined with another renewable or non-renewable fossil fuel. *Supra* note 41.

[51] Natural Resources Canada, online: Government of Canada <https://glfc.cfsnet.nfis.org/mapserver/pv/rank.php?lang=e>.

Table 1

Municipality in Canada	Yearly Photovoltaic Potential (kWh/kW)
Regina	1361
Calgary	1292
Winnipeg	1277
Edmonton	1245
Ottawa	1198
Montreal	1185
Toronto	1161
Fredericton	1145
Yellowknife	1094
Victoria	1091
Vancouver	1009
St. John's	933

Using international comparisons, Alberta's solar potential is also impressive. The table below demonstrates that Calgary and Edmonton have better photovoltaic potential than Germany, and today Germany is the global leader in integrating the photovoltaic technology.[52]

[52] Global Renewable Energy, online: International Energy Agency <http://www.iea.org/Textbase/pm/maps/images/World/photovoltaics.htm>.

Table 2

City	Yearly Photovoltaic Potential (kWh/kW)
Cairo, Egypt	1635
Capetown, South Africa	1538
New Delhi, India	1523
Los Angeles, U.S.A.	1485
Mexico City, Mexico	1425
Regina, Canada	1361
Sydney, Australia	1343
Rome, Italy	1283
Rio de Janeiro, Brazil	1253
Ottawa, Canada	1198
Beijing, China	1148
Paris, France	938
St. John's, Canada	933
Tokyo, Japan	885
Berlin, Germany	848
London, England	728

Some regulators in Canada have recognized the potential of solar energy and its benefits by adopting policy initiatives to promote greater use of this resource. It is these policies that will be reviewed next.

4.0. Policy Initiatives

4.1. Federal Policy Initiatives

The following federal initiatives have been launched to promote greater use of solar energy: financial incentives, tax credit, and grants. Each category is briefly described below.

In January 2007, Prime Minister Stephen Harper unveiled the $1.5-billion ecoENERGY fund to support renewable sources of electricity and heat. One of the components of this initiative, ecoENERGY for Renewable Heat Program, which runs from April 1, 2007 to March 31, 2011, entails a $36 million dollar investment intended to increase the use of renewable thermal energy by offering financial incentives to Canadian businesses, industries, and public institutions that purchase and install solar heating systems.[53] This program does not offer incentives directly to homeowners. The maximum available incentives to eligible projects are allocated thus: $80,000 per solar air installation, $400,000 per solar water installation, and $2 million for multiple corporate installations.

Solar panels, solar panel trackers, and solar heaters qualify for a home renovation tax credit. The tax credit is family-targeted and applies to purchases made after January 27, 2009 and before February 1, 2010. The goods must be purchased for an eligible dwelling. The maximum amount of the 2009 tax credit is $1,350 and it applies to expenses of more than $1,000 but not more than $10,000.[54]

Finally, the ecoENERGY Retrofit program offered grants for energy efficiency improvements and retrofits and applies to installation of solar hot water heaters that meet a prescribed standard. The maximum amount for both single family homes and multi-unit residential buildings was $1,250.[55]

The ecoENERGY program in some respects proved a victim of its own success. It was sufficiently popular that the funding was used up by early 2010, so that the program has effectively expired with the government's failure to renew its funding in the 2010 federal budget. Even had it been continued, the federal policy initiatives would represent but a first step towards greater integration of solar energy into the energy mix because these policy initiatives apply primarily in the context of direct use of solar energy. Indirect use of solar energy remains largely unaddressed.[56]

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[53] ecoENERGY for Renewable Heat, online: Government of Canada <http://ecoaction.gc.ca/ecoenergy-ecoenergie/heat-chauffage/index-eng.cfm>.

[54] Home Renovation Tax Credit, online: Canada Revenue Agency <http://www.cra-arc.gc.ca/hrtc>.

[55] National Resources Canada, online: Government of Canada <http://oee.nrcan.gc.ca/residential/personal/retrofit-homes/retrofit-qualify-grant.cfm?attr=4>.

[56] The main reason why indirect use should be addressed in a more meaningful way stems from the fact that the cost of electricity produced from solar energy remains higher than electricity generated from any other source of energy. One way to address this discrepancy in prices and to promote greater indirect use of solar energy is by introducing a feed-in tariff. The feed-in tariff requires utility companies to buy power from suppliers of electricity generated from solar energy at set rates for a specified period of time. This measure provides greater certainty that solar power producers would be able to recover their

4.2. Provincial Policy Initiatives

No programs specifically designed to promote either direct or indirect use of solar energy exist in Alberta. However, complementary programs at the provincial level have been implemented in Ontario,[57] Saskatchewan,[58] and British Columbia.[59]

Ideally policy initiatives should address technical, economic, and legal barriers simultaneously. Overlooking any one of these aspects undermines the effectiveness of policy initiatives. The goal of increasing the use of solar technologies under currently existing policy initiatives is largely undermined by the absence of statutory recognition of solar rights, so that legal barriers to solar generation remain largely unaddressed both at the federal and provincial levels. Unless there is a regulatory measure adopted at the municipal level, it falls to common law to determine the existence and scope of solar rights in any given case; the common law position with respect to solar rights is discussed below.

5.0. Common Law

In the absence of statutory protection or if such protection is inapt, it falls to common law to determine the existence and the extent of solar rights.[60] Since statutory protection of solar rights in Alberta is non-existent, it is therefore necessary to examine the common law position vis-à-vis solar rights and access to direct sunlight in particular. The discussion below first outlines how solar rights can be created and then examines how they can be protected if they are infringed.

5.1. Creation of Rights

At common law the closest analogy to a right to sunlight is found in the ancient lights

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investment and recurring expenses and gives consumers more meaningful ability to choose their electricity supplier.

[57] Ontario Ministry of Energy and Infrastructure, online: Government of Ontario <http://www.mei.gov.on.ca/en/energy/renewable/index.php?page=solar_about>.

[58] Saskatchewan Research Council, online: SRC <http://municipalities.src.sk.ca/html/municipalities/project_info>.

[59] SolarBC, online: SolarBC <http://www.solarbc.ca>.

[60] The analysis of regulatory measures adopted at the municipal level is beyond the scope of this paper. Adopting bylaws as a means of creating and regulating solar rights is not an adequate solution because piecemeal regulation, which is bound to vary geographically and which can be revoked at any time, is not conducive to the uniformity and certainty that users of solar technologies require.

doctrine. This doctrine is based on the idea of prescription, that is, the acquisition of a right as a result of sufficiently long duration of its enjoyment. Under this doctrine, a prescriptive easement could arise provided the right to light existed for a 20-year prescriptive period.[61] However, pursuant to provincial legislation, this doctrine is not applicable in Alberta.[62]

5.1.1. Easements

One way to impose an obligation upon the owner of an adjoining or a nearby property in order to preserve the ability of the owner of another property to receive sunlight by solar installations is by purchasing an easement. An easement can be defined as "a right attached to one particular piece of land which allows the owner of that land (the dominant owner) either to use the land of another person (the servient owner) in a particular manner … or to restrict its user by that other person to a particular extent, but which does not allow him to take any part of its natural produce or its soil."[63]

In general, easements in Alberta can be created expressly (by statute or an express grant) or impliedly (by means of common law but not by prescription[64]). As for solar easements, in the absence of statutory protection of solar rights in Alberta, such an easement can be created by way of an express grant or it might be implied if it is necessary for the reasonable enjoyment of the conveyed property. Whether the court upholds the existence of an implied easement depends on the facts in a particular case, and this inherently contingent outcome is not conducive to certainty.

Easements can be positive or negative. In the case of solar technologies negative easements would be more common because an expressly created negative easement can permit one to restrain activities on the property of another that would obstruct penetration of sunlight onto an adjacent or nearby property or properties. Easements are capable of being enforceable by and against successors in title to land.

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[61] The doctrine of ancient lights is not applicable in the context of solar installations on buildings and unbuilt land because the doctrine presupposes the existence of a building with openings through which light can be received and which can be significantly obscured by erecting obstacles for penetration of sunlight on the adjacent or nearby property or properties.

[62] *Law of Property Act*, R.S.A. 2000, c. L-7, s. 69(3).

[63] E.H. Burn, ed., *Cheshire and Burn's Modern Law of Real Property*, 15th ed. (London: Butterworths, 1994) at 518.

[64] *Law of Property Act*, *supra* note 62.

5.1.2. Restrictive Covenants

Restrictive covenants also enable one to impose a restriction upon the owner of an adjoining or a nearby property with the goal of controlling the use or development of land. A restrictive covenant is an example of "private planning law"[65] and typically stems from an agreement of two or more parties to the transaction.

Unlike easements, restrictive covenants cannot be implied and must be expressly created. A restrictive covenant reflecting a promise by one party to another not to build upon property, or not to use it in a particular manner, may be registered on the title as annexed to the land.[66] Certain common law requirements must be satisfied for restrictive covenants to be enforced by and against subsequent owners.[67] In addition, registration is required to make a restrictive covenant binding,[68] although registration of an instrument by itself does not create a restrictive covenant.[69]

The first owner, and every transferee, and every other person deriving title from the first owner, is deemed to be affected with notice of the covenant, and to be bound by it if it is of such nature as to run with the land, although the covenant may be modified or discharged by court order.

The effect of a restrictive covenant must be negative, although it may be worded positively. Thus, a restrictive covenant is not the instrument of choice if one wishes to impose a duty to trim trees. It may, however, be a useful tool for a group of property owners who wish to install solar technology on their properties in order to establish and protect their solar rights. Developers of new properties in the same subdivision might also find restrictive covenants useful for the protection of solar rights in a specific geographic location.

In sum, the two types of privately negotiated arrangements — easements and restrictive covenants — can provide only limited protection to users of solar technologies. Easements are likely to be more common in the context of already existing solar installations and between a smaller number of parties than restrictive covenants, which can be used on a larger scale in cases of new developments. Both easements and

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[65] S. Bickford-Smith *et al.*, *Rights of Light*, 2d ed. (Bristol: Jordan Publishing Ltd., 2007) at 19.

[66] *Land Titles Act*, R.S.A. 2000, c. L-4, s. 48.

[67] The following requirements should be satisfied: (1) the covenant must be restrictive or negative; (2) there must be a dominant tenement, which benefits from the restriction, and a servient tenement, which is subject to the restriction; (3) the covenant must be annexed to the land either expressly or by implication; and (4) the covenant must "touch or concern the land". If these requirements are not met an agreement becomes enforceable by the original parties or their assigns only. *Ibid*.

[68] *Ibid*.

[69] *Ibid*.

restrictive covenants are largely concerned with imposing negative obligations rather than positive duties, thus making it difficult to require owners of the encumbered property to spend money, time or other efforts in order to preserve their neighbours' access to direct sunlight.

5.2. Infringement of Rights

Common law can provide some measure of protection to users of solar technologies. Their ability to seek a remedy depends on where those rights emanate from. Where a solar right is established pursuant to an agreement creating an easement or a restrictive covenant, an action can be instituted under the terms of that agreement. As far as tortuous liability is concerned, the situation is different.

An interference with an interest in land gives rise to the tort of nuisance. If an interest in land is substantially affected, an activity which unduly interferes with the use or enjoyment of land may give rise to actionable nuisance. What amounts to substantial interference cannot be determined in the abstract; it is a question of fact in a particular case. In essence it entails balancing one landowner's use of land with his neighbour's quiet enjoyment of adjoining property.

One must distinguish further between public and private nuisance. The former concerns a wrongful act which interferes with the property of a class of persons, whereas the latter entails unlawful interference with an individual's property or property of a few individuals. This distinction between public and private nuisance may have important legal consequences for users of solar technologies depending on the facts in a particular case. Although private nuisance would be more common in the context of solar installations, public nuisance and/or mixed nuisance[70] is a distinct possibility as well if a tall building blocks sunlight or casts a shadow on many solar installations.

Nuisance can sometimes be combined with the tort of trespass, which arises when there is an interference with the possession of land. An activity which involves unjustifiable interference with the possession of land may give rise to actionable trespass. The main advantage of invoking this legal concept is that it is actionable whether or not the plaintiff has suffered any damage. It does not mean, however, that the invasion of air space is always actionable. Landowners have the right to control the air space located vertically above the land surface of their property. Sunlight which falls vertically upon a property will be protected by the law of trespass, but the application of this principle is considerably limited in northern latitudes because sunlight has to pass through the air space above the property or properties of others, and as such it will not be protected. Although of limited application, trespass may offer a measure of protection to large

[70] A mixed nuisance combines the elements of both types of nuisance.

landowners. Trespass might be relied upon when there is an intrusion into air space directly above the property. Some examples might include the following situations: an advertising sign encroaches upon air space above another's property; something falls upon the land; or particles in the air considerably impair access to sunlight above solar installations.

To summarize, common law can offer some measure of protection to users of solar technologies. It is impossible, however, to state precisely what the scope of that protection is because it depends on the circumstances and facts of each case. Whether this state of the law represents a satisfactory outcome is the subject of the discussion that follows.

6.0. Assessment of the Common Law Position

The common law solution with respect to solar rights in Alberta is unsatisfactory for a number of reasons. Firstly, there is no common law right to light in Alberta. Such a right may be found to exist if parties have created it by way of mutual consent and reflected it in an agreement. However, these private agreements are ineffective against the barriers that can be erected by municipal governments or homeowner associations.

Secondly, *ex ante* creation and regulation of solar rights is always preferable to *ex post* adjudication because the latter is inevitably slower, more expensive, and inherently uncertain.

Thirdly, it is the prevention of a violation, rather than compensation by way of damages, that matters more to users of solar technologies. Equitable relief — such as injunctive relief, specific performance, and declaratory relief — might be a better tool to prevent interference with solar rights, but equitable relief is within the court's discretion and not available as of right.[71] Awarding damages in lieu of equitable relief presents additional difficulties of how to measure not only the compensation in the event of the deprivation of access to sunlight but also the release of right as a result of permanent loss of amenity in the future (depending on how solar energy is used and the effect of its loss on the user). As a result, common law and equity cannot provide much needed clarity and certainty as to whether the rights of users of solar technologies exist, how and to what extent these rights are protected, what amounts to an uncompensated taking, and what compensation mechanisms should be used if such rights are lost temporarily or permanently.

[71] As far as injunctive relief is concerned, the tripartite test set out in *RJR-MacDonald Inc. v. Canada (Attorney General)*, [1994] 1 S.C.R. 311 will have to be satisfied. This test requires the applicant to demonstrate that there is a serious question to be tried, irreparable harm will result if the application is refused, and the balance of convenience lies in favour of granting the injunction.

Finally, it is necessary to reconcile the conflicting and broadly envisaged public interest objectives reflected in land-use and land-planning enactments with more specific and narrower private interests of those who wish to use solar technologies.

For these reasons uniform acknowledgment of solar rights in a statute is preferable to variable and factually dependent recognition that can be afforded by common law. The range of possible choices for statutory recognition of solar rights is quite broad, as some of the possible variants considered next will demonstrate.

7.0. Statutory Recognition

A number of possibilities for statutory recognition of solar rights already exist in other jurisdictions. The legislative experience in the United States is particularly instructive in that regard because thirty-six states have already adopted solar rights statutes. These statutes contain either a solar easement and/or a solar rights provision. The applicable provisions from the relevant statutes adopted in the States of New Mexico, Massachusetts, New Jersey, and Florida are presented below.

7.1. State of New Mexico

In New Mexico a homeowner can record ownership of a solar energy system, establish a solar easement by filing a declaration with the country clerk's office, and enforce a solar right by bringing a lawsuit.

> 47-3-8. Method of claiming; effect, limitations
>
> A solar right may be claimed by an owner of real property upon which a solar collector, as defined in Subsection A of Section 47-3-3 NMSA 1978, has been placed. Once vested, the right shall be enforceable against any person who constructs or plans to construct any structure, in violation of the terms of the Solar Rights Act … or the Solar Recordation Act … A solar right shall be considered an easement appurtenant, and a suit to enforce a solar right may be brought at law or in equity …
>
> 47-3-9. Recordation; effect of failure to record; contest
>
> A. Any person claiming a solar right shall record that right by filing a declaration in substantially the following form with the country clerk of each county in which is located any portion of the properties burdened by a solar right or any portion of the properties on which a solar right is claimed.[72]

[72] New Mexico Statutes Annotated 1978, online: State of New Mexico <http://www.emnrd.state.nm.us/ECMD/LawsRegulationsExecutiveOrders/documents/Article3SolarRights.pdf>.

7.2. State of Massachusetts

In Massachusetts restrictions against use of solar energy are void.

> Chapter 184, Section 23C. Solar energy systems: installation or use; restrictive provisions
>
> Section 23C. Any provision in an instrument relative to the ownership or use of real property which purports to forbid or unreasonably restrict the installation or use of a solar energy system as defined in section one A of chapter forty A or the building of structures that facilitate the collection of solar energy shall be void.[73]

The Massachusetts legislation also describes how an easement of direct sunlight may be acquired and what any instrument creating a solar easement may include.

> Chapter 187: Section 1A. Solar easements
>
> Section 1A. An easement of direct sunlight may be acquired over the land of another by express grant or covenant, or by a solar access permit as set forth in section nine B of chapter forty A.
>
> Any instrument creating a solar easement may include, but the contents are not limited to, all of the following:
>
> (1) A description of the dimensions of the easement expressed in measurable terms, such as vertical or horizontal angles measured in degrees, or the hours of the day on specified dates during which direct sunlight to a specified surface of a solar collector, device, or structural design feature may not be obstructed, or a combination of these descriptions.
>
> (2) The restrictions placed upon vegetation, structures, and other objects which would impair or obstruct the passage of sunlight through the easement.
>
> (3) The amount, if any, of permissible obstruction of the passage of sunlight through the easement, expressed in measurable terms, such as a specific percentage of sunlight that may be obstructed.
>
> (4) The provisions for trimming vegetation that would impermissibly obstruct the passage of sunlight through the easement including any compensation for trimming expenses.
>
> (5) Any provisions for compensation of the owner of property benefiting from the

[73] The General Laws of Massachusetts, online: Commonwealth of Massachusetts <http://www.mass.gov/legis/laws/mgl/184-23c.htm>.

easement in the event of impermissible obstruction of the easement.

(6) The terms or conditions, if any, under which the easement may be revised or terminated.

Any instrument creating a solar easement shall be recorded in the registry of deeds in the county or district or, in the case of registered land, in the registry district of the land court in which the land affected is situated.[74]

In addition, the legislation provides for solar access guidelines at the municipal level, in zoning ordinances or bylaws, and solar access permits.

Chapter 40A, Section 9B: Solar access

Section 9B. Zoning ordinances or by-laws adopted or amended pursuant to section five of this chapter may encourage the use of solar energy systems and protect solar access by regulation of the orientation of streets, lots and buildings, maximum building height limits, minimum building set back requirements, limitations on the type, height and placement of vegetation and other provisions. Zoning ordinances or by-laws may also establish buffer zones and additional districts that protect solar access which overlap existing zoning districts. Zoning ordinances or by-laws may further regulate the planting and trimming of vegetation on public property to protect the solar access of private and public solar energy systems and buildings. Solar energy systems may be exempted from set back, building height, and roof and lot coverage restrictions.

Zoning ordinances or by-laws may also provide for special permits to protect access to direct sunlight for solar energy systems. Such ordinances or by-laws may provide that such solar access permits would create an easement to sunlight over neighboring property. Such ordinances or by-laws may also specify what constitutes an impermissible interference with the right to direct sunlight granted by a solar access permit and how to regulate growing vegetation that may interfere with such right. Such ordinances or by-laws may further provide standards for the issuance of solar access permits balancing the need of solar energy systems for direct sunlight with the right of neighboring property owners to the reasonable use of their property within other zoning restrictions. Such ordinances or by-laws may also provide a process for issuance of solar access permits including, but not limited to, notification of affected neighboring property owners, opportunity for a hearing, appeal process and recordation of such permits on burdened and benefited property deeds. Such ordinances or by-laws may further provide for establishment of a solar map identifying all local properties burdened or benefited by solar access permits. Such ordinances or by-laws may also require the examination of such solar maps by the appropriate official prior to the issuance of a building permit.[75]

[74] *Ibid*.

[75] *Ibid*.

7.3. State of New Jersey

The State of New Jersey prohibits deed restrictions, covenants, bylaws, rules or regulations prohibiting the installation of solar collectors on certain roofs of dwelling units and provides for enforcement of the statute by the Commissioner of Community Affairs.

§ 45:22A-48.2. Solar collectors on roofs, homeowners' association authority limited

1. a. An association formed for the management of commonly-owned elements and facilities, regardless of whether organized pursuant to section 1 of P.L.1993, c.30 (C.45:22A-43), shall not adopt or enforce a restriction, covenant, bylaw, rule or regulation prohibiting the installation of solar collectors on certain roofs of dwelling units, as follows:

A roof of a single-family dwelling unit which is solely owned by an individual or individuals, and which is not designated as a common element or common property in the governing documents of an association; and

A roof of a townhouse dwelling unit, which for the purposes of this subsection means any single-family dwelling unit constructed with attached walls to another such unit on at least one side, which unit extends from the foundation to the roof, and has at least two sides which are unattached to any other building, and the repair of the roof for the townhouse dwelling unit is designated as the responsibility of the owner and not the association in the governing documents.

b. An association may adopt rules to regulate the installation and maintenance of solar collectors on those roofs as specified in subsection a. of this section, in accordance with subsection c. of this section, and as follows:

(1) The qualifications, certification and insurance requirements of personnel or contractors who may install the solar collectors;

(2) The location where solar collectors may be placed on roofs;

(3) The concealment of solar collectors' supportive structures, fixtures and piping;

(4) The color harmonization of solar collectors with the colors of structures or landscaping in the development; and

(5) The aggregate size or coverage or total number of solar collectors, provided that the provisions of paragraph (2) of subsection c. below are met.

c. (1) An association shall not adopt and shall not enforce any rule related to the installation or maintenance of solar collectors, if compliance with a rule or rules would increase the solar collectors' installation or maintenance costs by an amount which is estimated to be greater than 10 percent of the total cost of the initial installation of the solar collectors, including the costs of labor and equipment.

(2) An association shall not adopt and shall not enforce any rule related to the installation or maintenance of solar collectors, if compliance with such rules inhibits the solar collectors from functioning at their intended maximum efficiency.

d. The Commissioner of Community Affairs shall enforce the provisions of P.L.2007, c.153 (C.45:22A-48.2) in accordance with the authority granted under section 18 of P.L.1977, c. 419 (C.45:22A-38).

e. The provisions of P.L.2007, c.153 (C.45:22A-48.2) shall not apply to associations that are under the control of the developer as provided under section 5 of P.L.1993, c.30 (C.45:22A-47).[76]

7.4. State of Florida

Florida's legislation expressly acknowledges the socially beneficial nature of renewable resources and prohibits the adoption of ordinances which prohibit the installation of solar technology. The legislation also addresses the litigation contingency and creates an entitlement to costs and attorney's fees.

163.04 Energy devices based on renewable resources. —

(1) Notwithstanding any provision of this chapter or other provision of general or special law, the adoption of an ordinance by a governing body, as those terms are defined in this chapter, which prohibits or has the effect of prohibiting the installation of solar collectors, clotheslines, or other energy devices based on renewable resources is expressly prohibited.

(2) A deed restriction, covenant, declaration, or similar binding agreement may not prohibit or have the effect of prohibiting solar collectors, clotheslines, or other energy devices based on renewable resources from being installed on buildings erected on the lots or parcels covered by the deed restriction, covenant, declaration, or binding agreement. A property owner may not be denied permission to install solar collectors or other energy devices by any entity granted the power or right in any deed restriction, covenant, declaration, or similar binding agreement to approve, forbid, control, or direct alteration of property with respect to residential dwellings and within the boundaries of a condominium unit. Such entity may determine the specific location where solar collectors may be installed on the roof within an orientation to the south or within 45° east or west of due south if such determination does not impair the effective operation of the solar collectors.

(3) In any litigation arising under the provisions of this section, the prevailing party

[76] New Jersey Permanent Statutes, online: State of New Jersey <http://lis.njleg.state.nj.us/cgi-bin/om_isapi.dll?clientID=15260656&depth=2&expandheadings=off&headingswithhits=on&infobase=statutes.nfo&softpage=TOC_Frame_Pg42>.

> shall be entitled to costs and reasonable attorney's fees.
>
> (4) The legislative intent in enacting these provisions is to protect the public health, safety, and welfare by encouraging the development and use of renewable resources in order to conserve and protect the value of land, buildings, and resources by preventing the adoption of measures which will have the ultimate effect, however unintended, of driving the costs of owning and operating commercial or residential property beyond the capacity of private owners to maintain. This section shall not apply to patio railings in condominiums, cooperatives, or apartments.[77]

The statutory provisions cited above illustrate some of the outcomes that can be achieved when the mechanism of legal rights is employed. Before this mechanism can be used, however, it is necessary to recognize that solar rights deserve protection.

8.0. Conclusion

If the goal of greening the energy mix by increasing the share of renewable energy sources is to be achieved, a meaningful commitment to use such sources must be made and reflected in the regulatory framework. With particular respect to solar energy, a meaningful commitment would require statutory recognition of solar rights. The current legal position in Alberta is that no obstruction of light is impermissible. If this position is to change, the legislature must take the lead. Effective legislation would be based on the premise that certain instances of obstruction of light are not allowed, thus making it possible to transform a privilege to use solar technologies into a right that would enjoy state protection in the event of undue interference with it. The liberty to interfere with the activities of users of solar technologies will therefore be transformed into a duty not to do so in certain cases.

[77] The 2009 Florida Statutes, online: State of Florida <http://www.leg.state.fl.us/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0163/SEC04.HTM&Title=->2009->Ch0163->Section%2004#0163.04>.

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