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Is "Conservation" Worth Conserving? The Implications of Alberta's "Energy Resource Conservation" Mandate for Renewable Energy

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1.0. Introduction[1]

Energy issues have long received high priority by provincial and national policy makers in Canada, but energy is receiving particularly close attention these days due to heightened interest in cutting greenhouse gas emissions from energy production and consumption, as well as concerns relating to energy prices and national security, among others. Given the prominence of energy on government agendas, it is no surprise that Alberta's Premier Ed Stelmach has committed the province to develop a "comprehensive energy policy".[2] Alberta's fossil fuel endowments are a major focus of this new policy, because of their economic value and the role they play in the provincial and national economy.[3] In the context of total energy supplies, Alberta's reserves of renewable energy sources are also considerable and diverse,[4] although they tend to get less or no coverage in official reports of provincial energy reserves. For example, the province's most recent energy reserves report lists total current and estimated future renewable energy *production*, but provides no estimates of actual reserves of renewable energy sources.[5] By contrast, the report provides extensive, detailed reserves estimates for fossil fuels.[6] While still not given proportionate time in estimates of energy reserves, renewable energy resources are receiving growing interest from the public as well as investors – a predictable result of rising energy prices and heightened concerns about both climate change and the broader sustainability implications of society's dependence on non-

[1]This paper is based in part on a report that was submitted for the 'Energy Futures' paper series sponsored by the University of Calgary's Institute of Sustainable Energy, Environment and Economy. See Michael M. Wenig, Dr. William A. Ross, J.P. Jepp & Richard Panton, *Legal and Policy Frameworks for Renewable Energy in Alberta* (Calgary: ISEEE, 2007) (hereinafter "ISEEE Report"). This Report, and several other papers in the Energy Futures series which are referenced below, can all be downloaded from ISEEE's website: <http://www.iseee.ca/whatsnew/reports/reports.shtml>.

[2]Premier Ed Stelmach, *Government Priorities*, online <http://premier.alberta.ca/news/news-2006-dec-13-Priorities.cfm>; see also Alberta Government, *Speech from the Throne* (delivered by Hon. Norman L. Kwong, 7 March 2007), online: <http://www.gov.ab.ca/home/thronespeech/2007>. This commitment implies that the province does not already have such a policy. This said, the province does refer to energy in high level – *i.e.*, broad or cross-cutting – policy statements and has lower level policies dealing solely or substantially with various aspects of the energy sector. See generally ISEEE Report, *supra* note 1, ch. 3.

[3]For estimates of current fossil fuel reserves, see Alberta Energy and Utilities Board (EUB), *Alberta's Energy Reserves 2005 and Supply/Demand Outlook 2006-2015* (2006). For an overview of many of the challenges in developing these reserves, see Dr. Robert L. Mansell & Ron C. Schlenker, *Energy and the Alberta Economy: Past and Future Impacts and Implications*, Alberta Energy Futures Project Paper No. 1 (Calgary: ISEEE, 2006).

[4]See, *e.g.*, Mansell & Schlenker, *ibid.* at 48 (noting the "substantial potential for alternative and renewable energy" in Alberta).

[5]EUB, *supra* note 3 at 1. See also Mansell & Schlenker, *supra* note 3 at 48 (noting that, while "substantial", Alberta's alternative and renewable energy reserves are "undetermined").

[6]EUB, *supra* note 3, chs. 2-6, 8.

renewable fossil fuels. Thus, not surprisingly, the provincial commitment to develop a "comprehensive energy policy" will purportedly have a particular "focus" on renewable energy.[7]

In developing a new "comprehensive energy policy", the province arguably should rigorously assess the utility and logic underlying all existing energy-related policies and the linkages among them, rather than take those existing policies for granted. This reassessment is especially warranted by an additional recent event – the province's commencement of a legislative process to split its chief energy regulatory body, the provincial Energy and Utilities Board (EUB), back into two separate boards. One Board will deal with upstream fossil fuel production and the other with management of the province's electricity system.[8] This process warrants a reassessment of existing provincial energy policies to make sure that the two new energy Boards start their regulatory work with the proper underlying policy foundation and that the Boards are properly structured to effectuate those policies.

This paper assesses one of the most prominent of Alberta's existing energy policies, which is the legislative objective in the *Energy Resources Conservation Act* (*ERCA*), to "effect the conservation of, and prevent the waste of" Alberta's "energy resources".[9] This objective is paramount, in part, because of its purported application to a wide range of energy issues and resources. The Act defines "energy resource" broadly as any "natural resource" in the province that "*can* be used as a source of *any* form of energy".[10] Viewed by either its plain meaning or its legislative definition, the term "energy resource" arguably subsumes both non-renewable and renewable energy sources. From this standpoint, the Act is unique among Alberta's numerous energy-related statutes, others of which focus on particular kinds of energy sources[11] or on particular kinds of energy.[12]

Of course, the *ERCA*'s "conservation/waste prevention" purpose is not the only legislative energy policy that has such a broad application because the *ERCA*'s purpose section lists several other purposes relating to "energy resources". In a nutshell, these are to "provide" for the collection and dissemination of information about reserves of and

[7]*Throne Speech*, *supra* note 2.

[8]Bill 46, *Alberta Utilities Commission Act*, Third Sess., 26th Leg., Alberta, 2007 (1st reading 14 June 2007, Alberta Hansard (14 June 2007) at 1766-1767). See also Gordon Jaremko, "Energy regulator returns to the past: bureau splits into two agencies" *Calgary Herald* (13 April 2007) E1.

[9]R.S.A. 2000, c. E-10, s. 2(c).

[10]*ERCA*, s. 1(c) (emphasis added).

[11]See, *e.g.*, *Oil and Gas Conservation Act*, *Oilsands Conservation Act*, *Coal Conservation Act* and *Gas Resources Preservation Act*. R.S.A. 2000, c. O-6, O-7, C-17 and G-4, respectively.

[12]See *Hydro and Electric Energy Act*, R.S.A. 2000, c. H-16, and *Electric Utilities Act*, S.A. 2003, c. E-5.1.

demands for Alberta's "energy resources", and to minimize incidental adverse environmental effects and safety risks associated with the "exploration for, development, processing and transportation of energy resources and energy".[13]

However, the "conservation" mandate was the *only* legislative objective in the statutory predecessor to the *ERCA*.[14] And although there are now other objectives, the *ERCA*'s reference to "conservation" in its title suggests that the "conservation" purpose trumps all others. Thus, energy resource "conservation" is said to "'go to the very root'" of the EUB's "'purpose and existence'"[15] and is referred to as the Board's "primary objective" or "overriding mandate".[16] In fact, just as it appears in the *ERCA*'s title, this mandate was reflected in the name of the Energy Resources Conservation Board (ERCB), which is one of the two Boards that were combined into the EUB and that will be created again if and when the EUB is split.[17] (For simplicity, references in this paper to the "EUB" are intended to include the ERCB, unless otherwise noted.)

While the importance of the "conservation" mandate is clear, its actual meaning is not. The *ERCA* does not expressly define the term and provides only scant clues as to its meaning. This paper explores the meaning and utility of the Act's energy resource "conservation" purpose, particularly with respect to renewable energy resources. Part 2 provides an overview of the renewable energy sector. In Part 3, the paper addresses several plain or common meanings of the term "conservation" in renewable and non-renewable energy contexts and discusses the *ERCA*'s documentation of the term's meaning. Parts 4 and 5, respectively, further discuss the meaning of "conservation" from the standpoints of that term's use in several fossil fuel "conservation" statutes that operate in conjunction with the *ERCA*, and from the long history of oil and gas

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[13] *Ibid.*, ss. 2(a-b) and (d-g).

[14] *Oil and Gas Resources Conservation Act*, S.A. 1938, c. 1, s. 3.

[15] *Giant Grosmont Petroleum Ltd. v. Gulf Canada Resources Ltd.* (2001), 93 Alta. L.R. (3d) 242 at 259 (Alta. C.A.), Picard J.A., leave to appeal dismissed, [2001] S.C.C.A. No. 484.

[16] *EnCana Corp. v. Alberta (Energy & Utilities Board)* (2005), 33 Alta. L.R. (4th) 223 at 227 (Alta. C.A.), Hunt J.A.

[17] See *Alberta Energy and Utilities Board Act*, R.S.A. 2000, c. A-17. The ERCB was created in 1971. Bill 61, *Energy Resources Conservation Act*, 4th Sess., 16th Leg., Alberta, 1971, cl. 3. This Board was itself a successor to two prior iterations of oil and gas regulatory boards both of which also had "conservation" in their titles. See *Oil and Gas Resources Conservation Act*, *supra* note 14, s. 5 (creating the Petroleum and Natural Gas Conservation Board) as am. by S.A. 1957, c. 63, s. 6. (creating the Oil and Gas Conservation Board). As with its occurrence in the ERCB's title, the term "conservation" has been embedded in the names of energy regulatory agencies in numerous other North American jurisdictions. One leading example is the "California Energy Resources Conservation and Development Commission" (commonly known as the "California Energy Commission" or CEC), which was created through legislation in 1977 to oversee the development and supply of all energy resources, including renewable energy, for the State. CEC, *Warren-Alquist Act* (July 2007), §25200; see also generally <http://energy.ca.gov/commission>.

"conservation" programs and scholarship related to those programs. "Conservation" principles are often cited as guides for managing other natural resources[18] and thus have spurred a body of scholarship that addresses whether there is a uniform or comprehensive theory of "conservation" in *all* natural resource contexts. This paper makes some reference to that literature, but a full study of those sources and of lessons from other resource "conservation" contexts is beyond the current scope of this paper.

Part 6 uses the fossil fuel "conservation" experience in pondering the meaning and implications of renewable energy "conservation". Finally, Part 7 considers what, if any, legislative/policy reforms to the energy resource "conservation" mandate are warranted. We conclude that, while the *ERCA*'s application of its "conservation" mandate to all energy sources is beneficial in promoting an integrated, system-based energy policy, the mandate is generally due for a comprehensive overhaul, with an eye toward incorporating an integrated, full cost, life cycle, systems approach to Alberta's management of the production and consumption in the province of all energy resources.

2.0. Renewable Energy – A Primer

In order to assess the meaning of renewable energy "conservation", it is first useful to understand what "renewable energy" means and the factors bearing on that sector's development. The term "renewable energy" is generally considered to comprise non-biological energy resources that have an essentially infinite supply over time (*e.g.*, solar radiation, wind, waves, river flow, and ground source heat), and so-called regenerative, energy-bearing biological materials. However, this regenerative label belies complex questions about the ecological sustainability of harvest rates and of the energy needed for, as well as other impacts associated with, harvesting and producing biological energy sources.[19] For instance, California defines renewable hydro-electric facilities as those producing fewer than 30 megawatts (MW) per site, for purposes of the State's requirement that electricity retailers annually increase the portion of their electricity supply from renewable sources.[20] The State's exclusion of "large" hydro-electric facilities from this 'renewable portfolio standards' program was based on negative externalities associated with these large installations. Depending on the jurisdiction, thermal combustion of biomass may be limited and excluded from renewable energy incentive programs due to air quality concerns.

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[18]See, *e.g.*, Wallace F. Lovejoy & Paul T. Homan, *Economic Aspects of Oil Conservation Legislation* (Baltimore: Johns Hopkins University Press, 1967) at 8 (noting that the term "conservation" has been "applied to many programs concerned with protecting the public interest in the development of varied types of natural resources").

[19]ISEEE Report, *supra* note 1 at 2-3.

[20]CEC, *Renewables Portfolio Standard Eligibility Guidebook*, 2d ed. (Sacramento: CEC, 2007).

The renewable energy sector in general is growing at impressive rates, from several standpoints ranging from energy output and capacity, to commercial sales and investment.[21] While impressive in terms of absolute numbers, the growth of renewable energy capacity still lags the growth rates of energy demand, and the corollary additions of new thermal-based supply. Much of the value of renewable energy is imputed not to its actual contribution to grid operations, but to its characteristics as a 'green' or 'low impact' energy source.[22] Further, there is considerable debate over how quickly and how far society can and should transition from non-renewable fossil fuels to renewable sources.[23] But even those who believe that an immediate and complete transition is impractical and unnecessary still believe that a "tremendous growth rate" in renewable sources in this century is necessary to achieve long-term energy sustainability.[24] This said, considerations of desired growth in renewable energy should not precede or override considerations of more fundamental, systemic questions that need to be addressed in formulating sustainable energy policies.[25]

Within North America, the renewable energy sector has enjoyed robust growth in recent years, as partially shown in the following Table of trends in Canadian renewable energy sources:

[21]See, *e.g.*, Guy Dauncey, "Energy Markets and Trends: The Emerging Renewables Sector" (PowerPoint slides presented to the Conference on Biogas Opportunities in Alberta, Edmonton, 2-4 April 2006).

[22]See, *e.g.*, Travis Bradford, *Solar Revolution: The Economic Transformation of the Global Energy Industry* (Cambridge, MA: MIT Press, 2006). For a discussion of the relationship between renewable energy and low impact energy, see ISEEE Report, *supra* note 1 at 2-3.

[23]For example, a recent Calgary Herald editorial cautions that the province's fossil fuel supplies will "eventually run out" and argues that society needs to "act fast" and make a "psychological leap" to develop a "diversity of alternative energy sources" and a "visionary plan for a future without oil." "Heady days for the West – Consolidating our influence will depend on post-oil plan", *Calgary Herald* (14 March 2007) A16. For an example of a contrasting view, Canadian energy economist Mark Jaccard has written that, due to remaining available fossil fuel reserves and technologies for producing and using those fuels sustainably, an "imminent demise" of the fossil fuel-based economy is neither likely nor advisable. Mark Jaccard, *Sustainable Fossil Fuels – The Unusual Suspect in the Quest for Clean and Enduring Energy* (New York: Cambridge University Press, 2005) at 28.

[24]Jaccard, *ibid.* at 317.

[25]For a brief discussion of this concern, see ISEEE Report, *supra* note 1 at 3-5; see also Michael M. Wenig & Dr. William A. Ross, "Making Progress Toward a Truly *Integrated* Energy Policy" (March/April 2007) 31 LawNow 43-44; and Michael M. Wenig & Dr. William A. Ross, "Bringing Life to *Life Cycle Assessments*" (May/June 2007) 31 LawNow 44-46.

Renewable Energy Resource or Technology	Growth within Canada
Wind Power	Annual installed capacity has increased 30% on average over 6 years through 2005[26]
Solar Photo Voltaics	2003 installed capacity was roughly eleven times greater than total capacity in 1992[27]
Solar Thermal	Annual domestic sales roughly doubled in ten-year period from 1995 to 2005[28]
Shallow geothermal heat applications, such as ground source heat pumps	In the period 2004-06: 198% increase in installed capacity, 177% increase in number of units sold and 189% increase in sales revenue[29]
Hydrogeothermal Electric Systems	Largely limited to volcanic areas in eastern British Columbia, output from existing wells and generation systems remained constant during the period 1990 to 2006[30]
Engineered Geothermal Systems (EGS)	Deep dry rock well systems are now proposed in a test phase for oil sands operations[31]
Run-of-River Hydro	In response to BC Hydro's 2006 Call for Power, 22 companies/organizations submit tenders for 34 projects, of which 25 are awarded contracts.[32]

While this growth trend is impressive from a North American standpoint, the North American picture is less favourable from an international perspective. According to the National Energy Board (NEB), North American countries have a relatively low output of renewable energy (excluding large-scale hydroelectric production in Canada) compared

[26]Global Wind Energy Council, *Global Wind 2005 Report* (Brussels, Belgium: GWEC) at 30.

[27]Canadian Solar Industries Association, *International Sales and Budgets for Solar Technologies* (May 2005) slide 7.

[28]SAIC Canada, *Final Report – Survey of Active Solar Thermal Collectors, Industry and Markets in Canada* (Ottawa: Natural Resources Canada, 2005) at 11.

[29]Ted Kantrowitz, *Backgrounder – A Conceptual Look at GeoExchange Technology, its Market, and its Future* (Montreal: Canadian GeoExchange Coalition, 2007) at 6.

[30]Alan Jessop, unpublished report of current geothermal trends and potential, ISEEE Forum on Geothermal Energy (June 2007).

[31]M.C. Moore & B.J. Anderson, *Fuel Substitution in Oil Sands Operations* (Calgary: ISEEE, 2007) [unpublished draft].

[32]BC Hydro, News Release, "BC Hydro receives bids from across BC in 2006 Open Call for Power" (11 April 2006); BC Hydro, *CFT Results: F2006 Call for Power*, online: <http://www.bchydro.com/info/ipp/ipp47608.html>.

to other developed countries, especially those in Europe.[33] According to the NEB, North America's projected lag behind Europe is based less on bio-physical or other exogenous factors than on "social attitudes and policy environments" which are both modifiable.[34] From a macro-policy perspective, chief among the modifications needed are to redesign or correct energy markets to ensure that energy prices 'internalize' the social costs – including in particular the local, regional, and global environmental costs – of energy production and consumption.[35] Other important modifications include paying greater attention to multiple energy generating sources or technologies as working in complementary or synergistic roles, rather than as operating in stand-alone capacities.[36]

Technological innovation is another factor that may change the NEB's projected growth rates. But present renewable energy technologies appear to be sufficient to fulfill a far greater portion of the general demand for energy than is currently being utilized,[37] even given various constraints associated with them, such as the intermittency of renewable sources, remote locations, or lack of transmission access.[38] Thus, innovation is arguably not the primary impediment to renewable energy growth. Moreover, the rate of innovation itself is not an independent variable; it is at least partially dependent on government incentives and disincentives, market prices, and social attitudes. Because it plainly covers renewable energy, the *ERCA*'s energy resource "conservation" mandate would appear to be one government policy that plays a key role in the sector's development. However, the discussion below suggests that the role is hollow primarily, because of the mandate's uncertain meaning and its lack of inclusion of full cost, life

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[33]NEB, *Emerging Technologies in Electricity Generation – An Energy Market Assessment* (March 2006) at 4.

[34]*Ibid.* at 4.

[35]*Ibid.* at 7; Jaccard, *supra* note 23 at 265.

[36]See Mansell & Schlenker, *supra* note 3 at 55 (discussed *infra* at Part 7). For instance, gaps in availability of wind power due to its intermittency can be "firmed" with available hydro power or fossil thermal. Conversely, an emerging, diverse range of renewable technologies can be used to "firm" or back down fossil thermal generation.

[37]For example, one recent study estimates that "the technical potential for utilization of renewable energy is almost 20 times as high as the current global energy demand". A. Kofoed-Wiuff, K. Sanholt & C. Marcus-Moller, *Renewable Energy Technology Deployment (RETD) – Barriers, Challenges and Opportunities* (Paris: International Energy Agency, 2006) at 5.

[38]For example, because of the intermittent supply of wind, the "capacity factor" for wind turbines, especially at times of peak demand, is more limited than their maximum potential output. (In simple terms, "capacity factor" is the ratio of average actual use of a power supply to its available capacity or rated potential output.) However, advances in dispatch algorithms – *i.e.*, mathematical formulas used by electricity grid operators to allocate supply from generators to distributors – have been able to smooth the curve of power delivery by offering access to electricity from readily available alternate generators when wind is down. This "firming" capability can thereby reduce, if not eliminate, the discount in the price offered for wind-produced electricity because of its intermittency.

cycle considerations, and also because of the lack of a legislative framework for implementing the mandate with respect to renewable energy. These factors strongly suggest that the "conservation" mandate needs to be upgraded or replaced.

3.0. "Conservation" in the *ERCA* – An Undefined Purpose Without a Program

At first blush, the *ERCA*'s energy resources "conservation" mandate sounds like the kind of broad public policy needed to spur renewable energy growth, but what does energy "conservation" really mean? The term is well-known in science, where the "Law of Conservation" is a commonly used alternative name for the First Law of Thermodynamics which states essentially that the total quantity of energy in the Universe is constant. Under this Law, energy can change forms, but it can neither be created nor destroyed, so energy will always be "conserved".[39] From a thermodynamic standpoint, government programs to "conserve" energy in general are redundant or meaningless. Thus, the Legislature is unlikely to have intended the term "conservation" in the *ERCA* to mean energy "conservation" from a thermodynamic standpoint. To be clear, the First Law of Thermodynamics poses fundamental *constraints* on government and private efforts to develop sustainable energy systems. Thus, the Law is extremely relevant for policy-making and energy resource management, even if "conservation" is a meaningless or at least redundant policy *objective* from the standpoint of this thermodynamics principle.[40]

"Conservation" also has non-scientific, *i.e.*, plain or ordinary meanings. These appear to subsume "waste prevention" and thus suggest that the *ERCA*'s references to energy "conservation" and "waste prevention" are equivalent.[41] (Hence, references to "conservation" in the remainder of this paper implicitly include "waste prevention"

[39]See, *e.g.*, Edward S. Cassedy & Peter Z. Grossman, *Introduction to Energy: Resources, Technology, and Society*, 2d ed. (New York: Cambridge University Press, 1998) at 329-331.

[40]If anything, the *Second* Law of Thermodynamics provides a more immediate concern for energy policy makers than the First Law. The Second law states, essentially, that less energy is actually available for use each time it is converted in form or used to perform work due to losses in transformation, typically as heat. *Ibid.* While this constraint must be considered in any policy designed to ensure sustainable energy supplies to meet given demands, the Second Law is not considered a law of "conservation" so it was unlikely the Legislature intended that this Law was the source of the legislative term's meaning. For a discussion of the implications of the Second Law for sustainability policy, see Malte Faber, Reiner Manstetten & John Proops, "Entropy: A Unifying Concept for Ecological Economics" and "The Use of the Entropy Concept in Ecological Economics" in *Ecological Economics – Concepts and Methods* (Cheltenham, UK: Edward Elgar Publishing Co., 1996) chapters 6 and 7.

[41]For example, the Oxford English Dictionary (OED) defines the noun "conservation" as the act of "conserving" or as the "preservation from … waste". OED online: <http://dictionary.oed.com>.

unless otherwise noted.) While this facet of "conservation" is relatively clear, the following discussion shows that there are several other facets of the term's plain meaning that are much more ambiguous.[42]

As relevant here, there are two variations in the plain meaning of "conservation". One of these contemplates no diminution at all of a given resource.[43] This absolute concept is equivalent to "preservation" and arguably has no intuitive (or lay) application to production and use of non-renewable energy, because the total stock of those resources is necessarily diminished by each increment of production. In other words, under this definition, the only way to truly "conserve" a non-renewable energy resource would be to forego extracting, producing and using it altogether, except for those resources that can be used *in situ*. If applied to non-renewable "energy resources", this meaning would be nonsensical at least for those resources that need to be extracted and produced in order to be used for energy purposes.

The absolute concept of "conservation" also has an unclear application in the renewable energy context. Does it mean simply that the renewable nature of the energy resource should not be diminished, whether or not the resource is actually used to produce energy at any given time?[44] Or does the term mean that renewable energy resource *flows* should always be used – *i.e.*, that any unused flows are unacceptable energy losses?[45] (The term "flow" is used broadly here to include not only river flows for hydro-electricity, but continued supplies of all renewable resources including solar radiation, wind, geothermal heat, and the ongoing generation of biological materials.[46])

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[42]See Lovejoy & Homan, *supra* note 18 at 6 (noting that the term "conservation" "contains multiple ambiguities").

[43]For example, the OED defines the verb "to conserve" as to keep from "decay, or loss" or to preserve from "destruction or change", or to "preserve or maintain in being or continued existence". OED online, *supra* note 41. Similarly, one of the OED's definitions of "waste" is a gradual loss or diminution of a resource. *Ibid*., definitions II.8.a and 9.a. Thus, waste prevention logically means preventing gradual loss or diminution.

[44]For adherents of this view, see Ibironke Tinuola Odumosu, *Reforming Gas Flaring Laws in Nigeria: The Transferability of the Alberta Regulatory Framework* (LL.M. Thesis, University of Calgary Faculty of Law, 2005) [unpublished] at 24 ("Conservation of renewable resources entails the adoption of measures to ensure their renewability."); and Maurice J. Sychuk, "Conservation: Is it Justified in the Public Interest" (1969) 7 Alta. L. Rev. 355 ("Conservation of … [renewable resources] consists of safeguarding the basic conditions on which their renewability depends.").

[45]This meaning seems supported by those who view renewable resource "conservation" as "raising the level of output" of, or achieving a "high sustained yield" from, a renewable resource. Anthony Scott, *Natural Resources – The Economics of Conservation* (Toronto: McClelland & Stewart Ltd., 1973) at 27. See also Lovejoy & Homan, *supra* note 18 at 11 (citing another economist's view of "waste" as including "failure to procure the maximum yield from nature's renewable resources").

[46]Economists differentiate between "flow" and "stock" resources. A flow is simultaneously used and replaced while a stock resource is diminished in use.

The former of these two interpretations is intuitively appealing at first blush. But this appeal is less intuitive when one considers the potential opportunity costs of foregoing use of renewable energy resource flows. These include the costs associated with obtaining energy from some other sources, including non-renewable resources, to meet a given energy demand. Of course, there are costs to producing and using *any* kind of energy source – including renewable sources – but the notion of "conservation" as precluding a diminution of any energy resource provides no help in choosing among energy sources in light of their varying costs.

Another possible plain meaning of "conservation" is much less absolute than the meaning discussed above. Under this alternate meaning, "conservation" can result in some diminution of a resource provided the rate or quantity of diminution is socially acceptable.[47] This meaning makes intuitive sense in the downstream energy context where, even if seldom specifically defined, "energy conservation" has long implied simply using less energy or using it more efficiently.[48] However, this non-absolute meaning also has a better fit than the absolute meaning in the upstream, non-renewable energy context, in the sense that the non-absolute meaning accommodates the inevitable diminution associated with non-renewable resource production. On the other hand, the non-absolute meaning of "conservation" still does not seem to help in understanding whether, in the renewable energy context, "conservation" applies to the renewability of energy flows or to the energy that could be harnessed from those flows.

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[47]For example, one OED definition of the verb "to conserve" is to preserve "with care". OED online, *supra* note 41, definition #1. This is a non-absolute concept in the sense that acting "with care" may reduce diminutions but not necessarily eliminate them altogether. This non-absolute sense is reflected in one OED definition of "waste" as a "useless" diminution or "squandering" of a resource. *Ibid.*, definition II.5.a.

[48]For examples of the term's usage in downstream energy contexts but without being specifically defined, see, *e.g.*, Clean Air Strategic Alliance (CASA) Electricity Project Team, *An Emissions Management Framework for the Alberta Electricity Sector – A Report to Stakeholders* (Edmonton: CASA, 2003) at 88-91 (recommendations regarding improving energy "conservation"); Energy Solutions Alberta, "About Us", online: <http://www.energysolutionsalberta.com/default.asp?V_DOC_ID=865> (describing the organization's function as providing information on energy conservation and then referring to stories of steps taken to reduce "energy use" as well as improve energy efficiency and of "conservation practices"); Adrian J. Bradbrook, *Energy Conservation Legislation for Building Design and Construction* (Calgary: Canadian Institute of Resources Law, 1992).

Energy conservation in the downstream context is often referenced in conjunction with "energy efficiency". See, *e.g.*, CASA, *ibid.* at 88-91 (recommendations regarding improving both "energy efficiency and conservation"); and Energy Solutions Alberta, *ibid.* (organization's function to provide information to Albertans on energy efficiency and conservation). In some cases, energy conservation is referenced as specifically including energy efficiency. See, *e.g.*, Government of Alberta, *Albertans & Climate Change – Taking Action* (2002) at 29. However, energy efficiency does not necessarily entail using less energy in an absolute sense, but simply getting more "energy services" – *e.g.*, lighting, heating, cooling, and use of electronic equipment – from a given amount of energy. See, *e.g.*, Vaclav Smil, *Energy at the Crossroads – Global Perspectives and Uncertainties* (Cambridge, MA: MIT Press, 2003) at 318; and Jaccard, *supra* note 22 at 20.

Additionally, in both the renewable and non-renewable energy resource contexts, the non-absolute meaning of "conservation" leaves open *how* the socially acceptable levels of diminution are to be determined. Are rates or volumes of diminution resulting from unfettered markets benchmarks of socially acceptable diminutions, even when there is no price for the non-energy resource inputs and the market prices for the energy inputs do not reflect the 'external' social costs of producing those inputs?[49] If consideration is given to those non-market costs, how should they be weighed against the benefits of marginal energy production? Putting these questions another way, how much of a resource should be saved now so that it is available for future generations or metered as in the case of hydro-power so as to provide for multiple simultaneous uses?[50] Are future generations better served by having access to non-renewable resource stocks than to the capital or other products of the wealth gained from prior generations' production of that resource stock or, conversely, from avoiding the negative effects of such production in earlier generations? Does production in earlier generations promote additional exploration and technology development that actually increases available reserves for at least some number of subsequent generations?[51]

In short, the plain meanings of "conservation" raise several fundamental questions about the term's application in both the renewable and non-renewable upstream energy resource contexts. Unfortunately, the *ERCA* provides only incomplete answers to these questions because, as noted in Part 1 above, it lacks a definition of "conservation". However, facets of the term's meaning may be gleaned by negative inference from the Act's other purposes. One of these other purposes, to "ensure environment conservation", suggests that the Legislature did not consider "conservation" of energy resources and of the environment to be identical concepts.[52] Likewise, another purpose, to ensure "safe and efficient" practices in upstream energy exploration, processing, development and transportation activities, suggests that these goals are distinct from the Act's energy "conservation" goal.[53]

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[49]Alberta oil and gas producers' use of large amounts of water for 'enhanced recovery' provides a controversial example of energy producers' use of resource inputs that lack market prices. See generally, *e.g.*, Advisory Committee on Water Use Practice and Policy, *Preliminary Report* (Edmonton: 31 March 2004); Michael M. Wenig, "Water for Oil – How Much of a Trade Off Makes Sense" (June/July 2003) 27 LawNow 39.

[50]One "conservation" scholar refers to "conservation" as a "policy which aims at ensuring the future existence of resources by sacrificing ordinary investment, consumption, and leisure now, for the benefit of future generations." Scott, *supra* note 45 at 47; see also *ibid.* at 30 (similar "conservation" definition).

[51]For a discussion of these issues, see, *e.g.*, Robert W. Morrison, "Energy Policy and Sustainable Development" in G. Bruce Doern, ed., *Canadian Energy Policy and the Struggle for Sustainable Development* (Toronto: University of Toronto Press, 2005) at 89-91 and 93-95.

[52]*ERCA.*, s. 2(d).

[53]*Ibid.*, s. 2(e).

Clues as to what concepts may *not* be included under the "conservation" umbrella shed little light on what actually belongs under that umbrella. Besides failing to affirmatively define energy resource "conservation", the *ERCA* also lacks a clear mechanism for *implementing* that mandate and, as a result, the Act may fail to take advantage of the societal or grid benefits of energy "conservation". Other than the Act's threshold list of purposes, the only provision that actually refers to "conservation" is a section giving the EUB general authority to make recommendations to the provincial Cabinet on matters relating to energy development, including "energy conservation".[54] If anything, this section suggests the Legislature left it to the EUB to figure out what "conservation" really meant rather than provide its own view as to the term's meaning.

Another relevant *ERCA* provision requires the EUB to consider the "public interest" whenever the Board is required to decide whether to approve, or make any other decision regarding, the project under any other statute.[55] These "public interest" determinations presumably should reflect consideration of the Act's several purposes, including the "conservation" objective.[56] Conversely, this provision suggests that the EUB's efforts to "conserve" energy resources must fit within a broader "public interest" objective,[57] although it is uncertain how and whether "conservation" actually serves that broader "public interest", as discussed further below.

Among the statutes to which the *ERCA*'s "public interest" standard applies are several relating specifically to upstream oil and gas and coal development (discussed further below), and another statute – the *Hydro and Electric Energy Act*.[58] This Act generally requires the EUB's approval of proposed projects for electric power generation (termed "power plants" under the Act), and for transmission, and distribution, and of various facilities related specifically to hydro-electric power production. The Act's approval requirement generally applies to electric power generated from all sources, including renewable energy.[59] Thus, the *ERCA*'s "public interest" decision-making standard for

[54]*Ibid.*, s. 21(b).

[55]*Ibid.*, s. 3. More specifically, this section applies whenever the EUB is required by another statute to conduct a "hearing, inquiry, or investigation" with respect to an energy resource "project". *Ibid.*

[56]See, *e.g.*, EUB, *Policy Review of Solution gas Flaring and Conservation in Alberta* (June 1997) at 14 ("The purview of public interest includes … conservation of non-renewable resources."); and *Giant Grosmont*, *supra* note 15 at 261 (referencing the "public interest in energy resource conservation"). In contrast with this implied link to "conservation", the *ERCA* specifically states (s. 3) that the EUB's "public interest" review of proposed projects must reflect consideration of the "social and economic effects of the project and the effects of the project on the environment".

[57]*Giant Grosmont*, *ibid.* at 264 and *Encana Corp.*, *supra* note 16 at 227 (both decisions referring to the EUB's responsibility for the "conservation of energy resources in the public interest").

[58]R.S.A. 2000, c. H-16, ss. 5, 9-19, and 25.

[59]See ISEEE Report, *supra* note 1 at 36-41.

these approvals provides the most direct application of the *ERCA* to the renewable energy sector.[60]

In sum, the *ERCA*'s "conservation" objective sounds lofty and is spoken of reverentially in Alberta.[61] But the Act's text appears to be largely symbolic and lacks a definition of the objective and provisions to implement it, and thus provides virtually no clues as to its meaning. This kind of omission would generally warrant giving the Legislature a failing grade for poor bill drafting. However, this criticism is somewhat harsh in the case of the *ERCA*'s "conservation" mandate, at least in the fossil fuel context, because there are additional, external clues as to the term's meaning in that context.[62] These clues are several provincial fossil fuel "conservation statutes" and, more significantly, the historic use of the "conservation" term in the oil and gas sector. The following three parts of this paper discuss those clues and what, if any, light they shed on the meaning of the *ERCA*'s "conservation" mandate for the renewable energy sector.

4.0. The Fossil Fuel "Conservation" Acts

Three fossil fuel "conservation statutes" – the *Oil and Gas Conservation Act* (*OGCA*), the *Oilsands Conservation Act* (*OCA*), and the *Coal Conservation Act* (*CCA*) – have "conservation" and "waste prevention" purposes that echo those in the *ERCA*.[63] Indeed, these objectives have been considered the "pervasive and uniting theme" of the *ERCA*

[60]While the EUB's electricity project approvals are generally subject to the *ERCA*'s "public interest" test, the EUB is precluded from considering the "need" for electricity generating projects in deciding whether those projects are in the "public interest". For a discussion of the problems with this kind of need-blind public interest inquiry, and of the EUB's general role in approving hydro and electrical energy projects, see *ibid.* at 36-38.

[61]Outside of Alberta, former U.S. President Taft is reported to have observed that "conservation" is "something a great many people are in favour of, no matter what it means." Sychuk, *supra* note 44 at 355.

[62]The criticism may be unduly harsh for the additional reason that the Legislature's failure to define "conservation" is hardly unique among users of the term. As noted by one "conservation" scholar, "there are many books with the word 'conservation' in their title which seem never to define the phrase and to do nothing more than to describe the current situation of supply *vis-à-vis* demand for each of a dozen or so resources." Scott, *supra* note 45 at 28. Annual reports published by the EUB entitled "Conservation in Alberta" are perfect examples of these unexplained references. While the reports' title suggests they would contain an articulation of the Board's abstract view of "conservation", the reports were simply an annual accounting of the Board's activities under the overall category of energy resource and environmental "management". See, *e.g.*, ERCB, *Conservation in Alberta* (1972, 1981).

[63]*OGCA*, s. s. 4(a); *OSCA*, s. 3(a); and *CCA*, s. 4(d). The *OGCA* defines "gas" as including methane but only if it is recoverable via a well tied to an "underground reservoir". *Ibid.*, ss. 1(y), (ee) and (tt). Thus, this Act is inapplicable to methane recovery from so-called renewable energy sources – *e.g.*, from landfills or from anaerobic digestion of manure or domestic wastes.

and the two conservation statutes listed above that cover oil and gas.[64] However, like the *ERCA*, none of these three fossil fuel conservation statutes specifically defines "conservation" but, unlike the *ERCA*, these three do define "waste"[65] and then generally prohibit activities that "commit waste".[66] These statutes' "waste" definitions might therefore be considered evidence of legislative intent regarding the meaning of "conservation". However, as with the *ERCA*, the three statutes' plain references to both "conservation" *and* "waste" prevention might suggest the Legislature considered the two mandates distinct, if not closely related. In addition, the following analysis of the three statutes' "waste" definitions suggests that they too are ambiguous. The analysis also questions whether the statutes' "conservation" focus is defined more by what the statutes' other provisions do than by some abstract or general principle that actually guides the EUB's exercise of discretion in implementing those provisions.

Starting with the *CCA*, that Act's definition of "waste" refers to reductions in coal recoveries that result from "careless or improvident" mining practices and of "needless deterioration" of coal quality.[67] This definition is generally consistent with the non-absolute plain meanings of "conservation" and "waste" discussed in Part 3 above; yet, as with those lay meanings, the *CCA* definition's standards of conduct are inherently ambiguous. Are they defined by individual firms' own policies, by the best practices among all coal producers or some other industry benchmark, or by broader measures of social acceptability that account for costs and benefits which are external to the producers' own bottom lines?

The "waste" definitions in both the *OGCA* and *OSCA* are more complex than the *CCA*'s definition in that they have two parts. One part is a bare-bones reference to the "ordinary meaning" of "waste". (The lay person's "ordinary meaning" is discussed in Part 3 above and, thus, need not be repeated here.) However, there is some question as to whether the Legislature meant "ordinary" from a lay person's standpoint or from the historical usage of the term in the specific context of oil and gas regulation.[68]

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[64]*Giant Grosmont*, *supra* note 15 at 259. See also *Alberta Energy Co. v. Goodwell Petroleum Corp. Ltd.*, (2004) 22 Alta. L.R. (4th) 4, Fruman J.A. (noting that the *ERCA*, *OGCA*, and *OSA* "create a single regulatory regime that requires each statute to be read in the context of the other statutes within the overall scheme.").

[65]*OGCA*, s. 1(1)(ccc); *OSCA*, s. 1(1)(s); and *CCA*, s. 1(1)(r).

[66]See *OGCA*, s. 107; *OSCA*, s. 22; and *CCA*, s. 46.

[67]*CCA*, s. 1(1)(r).

[68]See Owen L. Anderson, *Oil and Gas Conservation on Canada Lands, Working Paper No. 7* (Calgary: Canadian Institute of Resources Law, 1985) at 26 (interpreting the "ordinary meaning" of waste as referenced in Canadian federal oil and gas legislation as referring to the "'ordinary *oil and gas law* meaning'" rather than to an ordinary meaning in a more general context (emphasis in original); and *Canada Oil and Gas Operations Act*, R.S.C. 1985, c. O-7, s. 18(2) (defining "waste" as its "ordinary meaning" *as well as* "waste as understood in the oil and gas industry").

The second part of the "waste" definitions in the *OGCA* and *OSCA* consists of a cross-reference to "wasteful operations" which term, in turn, is defined in both statutes by a list of several categories of wasteful activities. The listed categories differ somewhat between the two Acts but, read together, all of the categories (with one exception discussed below) essentially mimic the non-absolute approach of the (lay person's) "ordinary meaning" of waste. Thus, these categories cover operations that result in reduced recoveries or surface losses of oil and gas or bitumen that are considered "excessive", "improper", "inefficient", not "economic", or not justified by "sound engineering and economic principles".[69] It is debatable whether the standards "excessive" or "improper" provide any more guidance than the lay person's "ordinary meaning" of waste, as discussed in Part 3 above. The remaining three standards appear more specific, but even these provide ambiguous guidance for drawing lines between non-wasteful and wasteful losses. Are the concepts of "economic" and "efficient" practices viewed from firm-based, industry-wide, or broader social perspectives? If the latter, to what extent should they involve considerations of the externalities and life cycle costs of upstream oil and gas production? What is the ultimate or underlying social objective of, or reason for, restricting losses to only those that are justified by "sound" engineering and economic principles?

Given these ambiguities, it is not surprising that the EUB itself has observed that the "specific details" of the factors listed in the *OGCA*'s definition of "waste", including the "economic tests", are "left to the discretion" of the Board.[70] Put another way, the Legislature has purported to make a significant policy decision by generally prohibiting "waste", but has effectively passed that policy function off to the Board by defining "waste" in such broad, ambiguous terms as to leave effective interpretation to the Board's *ad hoc* or generic decisions.

As noted above, the *OGCA* and *OSCA* list an additional category of "wasteful operations" that does not generally track the non-absolute "ordinary" meaning. This category covers operations that produce petroleum fuels and related products "in excess of proper storage facilities or of transportation and marketing facilities *or of market demand*" for them.[71] While this category lacks the ambiguities associated with the non-absolute standards of conduct, its reference to "market demand" is similarly ambiguous or open ended. The *OGCA* defines "market demand" as the amount of oil or gas that is "reasonably needed for current consumption, use, storage and working stocks within and outside Alberta."[72] It is arguably hard enough to forecast demand for oil and gas by calculating historic demand and then predicting future trends in commercial and non-

[69] *OGCA*, s. 1(1)(ddd); and *OSCA*, s. 1(1)(t).

[70] EUB, *Policy Review*, *supra* note 56 at 15.

[71] *OGCA*, s. 1(1)(ddd)(vii); and *OSCA*, s. 1(1)(t)(iv) (emphasis added).

[72] *OGCA*, s. 1(1)(dd). By contrast, the *OSCA* does not define "market demand".

commercial activities that use oil and gas. But adding a determination of a "reasonable" need for oil and gas impliedly requires additional, complex determinations of current and potential future efficiencies of these uses and of availabilities of alternative fuels and non-energy sources for oil and gas products. To make matters worse, "market demand" is itself a function of government policy and regulation, particularly with respect to social costs that are external to market prices. Because "market demand" does not occur within some 'natural state', any government decision-making under these statutes based on predictions of "market demand" is a circular exercise.[73] However, this is somewhat of an overstatement from the EUB's perspective, because the Board might simply take other government decisions affecting market demand as givens for purposes of the Board's own determinations of "market demand" and, accordingly, of whether any oil and gas operations are "wasteful" under the Act.[74]

In sum, the three fossil fuel "conservation" acts purport to flesh out the *ERCA*'s "conservation/waste prevention" mandate through the statutes' "waste" definitions, but those definitions are themselves ambiguous. Thus, it is no surprise that the EUB has reported to have "engaged in many debates over the years to try to define the most appropriate criteria for determining the difference between waste and acceptable production practice."[75]

Of course, the Acts' "waste" definitions (and accompanying prohibitions) are not the only legislative clues as to the meaning of oil and gas "conservation" in Alberta. In addition to defining and generally prohibiting "waste", the three fossil fuel "conservation" statutes contain extensive regulatory regimes (all implemented by the EUB) for their respective fossil fuel sectors. Thus, one might say that the statutes' conservation mandates are defined, if not directly then indirectly, by the nature and scope of those regulatory regimes. Even under this interpretation, it is still difficult to glean an abstract meaning of "conservation" because the Acts contain little additional policy direction, beyond their "conservation" purposes and several other purposes (like those in

[73]The *OGCA* has an additional provision allowing the EUB to issue orders essentially pro-rating allowable quantities of production among sets of producers to ensure that the cumulative production does not exceed the market demand for the produced oil or gas. However, the scope of excess production subject to these orders is narrower than the scope of "wasteful operations" defined by the Act's "market demand" provision, in the sense that the former are tied to the capacity of pipelines and processing facilities for handling produced oil and gas, rather than to the market demand for those resources more generally. See *OGCA*, s. 34; see also generally Steven A. Kennett, ed., *Canada Energy Law Service – Alberta* (CELS) (Thomson-Carswell, 2005) Part 9, §§232-242.

[74]Research of on-line legal data bases and informal inquiries to the EUB revealed no record of any enforcement actions the EUB has brought against operations that the Board considered "wasteful" due to their production in excess of "market demand". However, a formal request of the EUB's own enforcement records, under the province's *Freedom of Information and Protection of Privacy Act*, R.S.A. 2000, c. F-25, is needed to definitively assess this track record.

[75]EUB, *Policy Review*, *supra* note 56 at 15.

the *ERCA*), as to how the EUB should exercise its regulatory discretion. For example, section 10 of the *OGCA* gives the EUB extensive regulation-making authority by listing roughly fifty different tools or subject areas that the Board can adopt or address through regulations. But this provision gives the Board essentially blanket authority to decide which tools to adopt or subject areas to cover through regulations and how to design the tools or otherwise address those regulatory subjects.

Given this legislative policy vacuum, one might conclude that "conservation" is more of a label for the EUB's broad regulatory discretion than a coherent, self-standing resource management principle.[76] This interpretation has considerable appeal from a practical standpoint, but it arguably offends legal principles for legislative interpretation because it would essentially render the "conservation" provision in the Act's purpose section meaningless and provide no good guidance for energy resource developers. Absent meaningful legislative clues, the historical usage of "conservation" in the oil and gas industry likely provides the most compelling evidence of this meaning although, as discussed below, that evidence itself is unclear as to what "conservation" means and hardly provides a clear roadmap for applying the concept to the renewable energy sector.

5.0. The Historical Meanings of Oil and Gas "Conservation"

The term "conservation" has long been a mantra for managing conventional upstream oil and gas production in Alberta and in other Canadian and U.S. jurisdictions.[77] There is an extensive record of this "conservation" history, including generic "conservation" policies and case-specific "conservation"-based decisions of regulators relating to numerous different aspects of oil and gas production. And there is a considerable body of "conservation" scholarship providing theoretical, empirical, and historical analyses. The aim of this Part is not to provide a comprehensive review of this historical record but simply to glean the salient facets of the oil and gas "conservation" history, relying primarily on secondary sources, in order to determine what if any clues this history provides for understanding the meaning of renewable energy "conservation". For this purpose, the discussion below will generally address the following topics:

- The original impetus for the development of oil and gas "conservation" programs;

[76]Lovejoy and Homan echo this view implicitly by noting the lack of distinct "conservation"-type regulations and that, in "popular [petroleum] industry usage, 'conservation regulation' is the behavior enforced upon the industry by regulatory statutes and agencies". *Supra* note 18 at 9. See also, *e.g.*, David H. Breen, *Alberta's Petroleum Industry and the Conservation Board* (Edmonton: University of Alberta Press, 1993) at 1 (noting that the "entire range of activities" conducted by "conservation boards" is "commonly described by the phrase 'conservation' regulation.").

[77]Further research is needed to determine how the concept has been applied in the coal sector.

- The kinds of classic oil and gas and oilsands "conservation" programs;
- The underlying objectives of those programs and limitations in their scope;
- The extent to which those "conservation" objectives are subsumed under the legislative reference to "conservation", when read plainly and in light of other, distinct legislative purposes;
- Whether there is a coherent, unambiguous "conservation" theory that unifies the various oil and gas "conservation" objectives as well as notions of resource "conservation" more generally; and
- How the historical notions of oil and gas "conservation" might serve, or otherwise relate, to broader notions of the "public interest".

Oil and Gas "Conservation" Problems and Programs

The history of oil and gas "conservation" goes back to the pioneer programs for regulating oil and gas production in the U.S.[78] In both the U.S. and Canadian contexts, oil and gas "conservation programs" were developed in response to courts' application of the common law 'rule of capture' to petroleum reservoirs. Under this rule, a person who has rights to produce sub-surface minerals under one tract of land is not liable to any holders of mineral rights under neighbouring tracts for loss of oil and gas drained from under those tracts by a well drilled on the person's own land. The practical effect of the rule is to encourage oil and gas rights holders to drill wells as quickly as they can, through as many wells as possible, to avoid losing access to reserves that might be drained by neighbouring holders of 'correlative' rights to the same pool. These incentives in turn can cause over-investment in production, sloppy practices resulting in surface losses, and rapid drainage that reduces reservoir pressures and thus the total volumes recovered from each reservoir being produced.[79]

To remedy the problems that have been of concern to "conservation" programs, the classic or most common tools used in those programs have been requirements to minimize the flaring of natural gas and other kinds of surface losses of oil and gas during production, and to require 'enhanced recovery' techniques and specified production rates

[78]See, *e.g.*, Michael J. Wozniak, "Expanding Authority of Oil and Gas Conservation Commissions" in *Proceedings of the Rocky Mountain Mineral Law Fifty-Second Annual Institute, July 20-22, 2006* (Westminster, CO: Rocky Mountain Mineral Law Foundation, 2006), ch. 15 at §15.03; and G.W. Govier, "The Administration of the Oil and Gas Conservation Act in Alberta" (1969) 7 Alta. L. Rev. 341.

[79]See, *e.g.*, Wozniak, *ibid.* at 15-6 – 15-8; Nigel Bankes, "Pooling Agreements in Canadian Oil and Gas Law" (1995) 33 Alta. L. Rev. 493 at 497-498 & n. 19; J.T. Cawley, "Oil and Gas Conservation in Saskatchewan" (1969) 7 Alta. L. Rev. 347; and Anderson, *supra* note 68 at 5.

and well spacings to maintain reservoir pressures.[80] (In the latter sense, it might be more fitting to say that the resource being "conserved" is reservoir pressure rather than the oil or gas being produced.[81])

As with the plain or ordinary meaning of "conservation", these historic "conservation" programs have generally been considered to be equivalent to, or to at least include, the concept of "waste" prevention.[82] Thus, "waste" prevention can be considered an underlying "conservation" objective from a historical standpoint. However, this linkage of "conservation" and "waste" prevention is questionable when viewed from a legislative standpoint, because the *ERCA* and oil and gas "conservation" statutes all refer to those terms as related but *distinct* concepts (as noted in Parts 3 and 4 above).[83]

Several underlying objectives have been mentioned in connection with the conventional oil and gas conservation programs discussed above:

- maximizing recovery in any given reservoir;
- ensuring equitable access among correlative owners of production rights to a given reservoir; and
- preventing over-investment in production which is often referred to as "economic waste" or inefficiency (*i.e.*, excess production expense per unit of output).

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[80]See generally Breen, *supra* note 76; see also, *e.g.*, Odumosu *supra* note 44, ch. 4; Govier, *supra* note 78 at 341; and Anderson, *supra* note 68 at 6-7.

[81]See Scott, *supra* note 45 at 163 (referring to oil pro-rationing schemes as having the effect of "conserving" both the oil and underground gas pressure).

[82]Several sources addressing oil and gas "conservation" confirm this linkage to "waste prevention". See, *e.g.*, *Giant Grosmont*, *supra* note 15 at 259 (referring to waste prevention as one of several "conservation issues"); Odumosu, *supra* note 44 at 24-25 (referring to "conservation" as aimed at "efficient production to eliminate waste") but *cf.* at 28-29 (noting that the *ERCA* seems to treat "conservation" and "waste" prevention as distinct concepts); Sychuk, *supra* note 44 at 355-356 (noting that non-renewable resource "conservation" includes "prevention of waste"); Cawley, *supra* note 79 (referring to fossil fuel conservation legislation as designed to prevent waste); Anderson, *supra* note 68 at 1 (referring to the "interest of conservation" as "[t]he focus" of federal oil and gas conservation legislation and waste prevention as the statute's "major goal"); Lovejoy & Homan, *supra* note 18 at 9 (adopting a concept of "conservation" as "tied to the idea of 'prevention of waste'"); and George W. Govier, *Oil and Gas Conservation* (Paper presented to the Canadian Institute of Mining and Metallurgy, Western Annual Meeting, Vancouver, B.C., 6-8 November 1950) at 2 (noting that the "concept of conservation" is "essentially the elimination of waste while preserving equity").

[83]In other words, under this plain reading, had the Legislature intended "waste" prevention to be a sub-set of "conservation", it would have drafted the *ERCA*'s purpose as to effect the "conservation, *including* waste prevention", of energy resources, rather than to effect the "conservation of, *and* prevent the waste of" those resources.

(Price stabilization or maintenance was an additional historical objective, at least, in some jurisdictions, although there is some question whether this was a 'true' "conservation" objective.[84]) However, not all of the three objectives are consistently mentioned among "conservation" scholars; nor does there seem to be a consensus on their relative importance.[85] Compounding this confusion, Alberta's two oil and gas "conservation" statutes collectively expressly aim to promote "efficiency" and protect correlative rights, *in addition to* ensuring oil and gas "conservation".[86] Thus, as with the texts' distinction

[84]See Anderson, *supra* note 68 at 5 (noting that over-production caused rapid decline in oil prices which made many wells uneconomical); Lovejoy & Homan, *supra* note 18 at 4 (referring to state government efforts to support higher and firmer oil price levels as among the original programs that "came to be embraced under special meanings of the term 'conservation'"); and Scott, *supra* note 45 at 253 (noting that, following oil price drops from over-production in the 1920s, the U.S. government has taken steps to "encourage the reduction in production in the name of conservation; but the chief actual aim was to raise the price."). But see Sychuk, *supra* note 44 at 360 (noting a study indicating that historical conservation programs have not affected oil and gas prices).

[85]For a range of perspectives on the primary objectives of oil and gas "conservation", see, *e.g.*, Wozniak, *supra* note 78 at 15-12 (noting a mixed record, among U.S. State "conservation" programs, as to including economic waste as a relevant factor in determining well spacing and drilling units); Odumosu, *supra* note 44 at 25 (focusing on efficiency and maximizing production) but *cf.* at 27 (noting that "other factors" besides economic efficiency, including environmental and socio-political ones, "come into play" in "conservation" decision-making); Nigel Bankes, "Compulsory Pooling Under the Oil and Gas Conservation Act of Alberta" (1997) 35 Alta. L. Rev. 945 at 950 (listing, as one of the "main objectives" of oil and gas conservation legislation, the equitable allocation of production among owners of rights to produce a given reservoir); Bankes, *supra* note 79 at 498 (referring to well spacing requirements under "conservation legislation" as intended to avoid over-investment as well as to maximize recovery); Breen, *supra* note 76 at 538 (referring to "conservation" as the "search for maximum efficient but equitable production") and 539 ("maximum long-term economic recovery"), but see *ibid*. at 4 (noting the "diverse" and "inconsistent" "strands of thought" underlying "conservation"); Kemp Wilson, "Conservation Acts and Correlative Rights: Has the Pendulum Swung too Far?" (1989) 35 Rocky Mtn. Min. L. Inst. 18-1; Anderson, *supra* note 68 at 1 (describing the goal of waste prevention as "achieving the maximum recovery of oil and gas in the most efficient, effective, safe and economic manner."); G.C. Watkins, "Conservation and Economic Efficiency: Alberta Oil Proration" (1977) J. Envtl. Econ. & Mgmt. 40 (referring to "regulatory systems intended to promote conservation in the sense of maximizing oil recovery"); Michael Crommelin, "Government Management of Oil and Gas in Alberta" (1975) 13 Alta. L. Rev. 146 at 147-148 (noting the lack of "clear indication that the Alberta government has sought to manage Crown oil and gas resources with the objectives of efficiency in mind."); Govier, *supra* note 78 at 341 (noting that Alberta programs have probably focused more on eliminating waste and maximizing recovery than conservation programs in the U.S.); Sychuk, *supra* note 44 at 356 (noting an earlier scholar's conclusion that the "primary aims" of conservation programs have been the "'coequal[l]'" objectives of maximizing recovery and protecting correlative rights); but *cf. ibid.* at 362 (noting that conservation practices have improved but not maximized economic efficiencies of production) and 366 (noting that "market stability" was the "major if not the primary" reason for conservation legislation in the 1930s); and Lovejoy & Holman, *supra* note 18 at 27 (noting differing views as to whether waste prevention and protection of correlative rights are co-equal "conservation" objectives).

[86]Efficiency is listed in one of the *ERCA*'s purposes and in two of each of the other conservation acts' lists of purposes. *ERCA*, s. 2(e); *OGCA*, ss. 4(b) and (c); *OSCA*, ss. 3(b) and (g); and *CCA*, ss. 4(c) and (f).

between "conservation" and "waste" prevention, these distinct legislative references suggest that the Legislature intended "conservation" to mean something *other* than promoting "efficiency" and protecting correlative rights.[87]

In the oil sands context, the "conservation" principle has been especially prominent as a justification for the EUB's issuance of orders shutting in wells for producing reserves of natural gas that are "associated" with underlying bitumen deposits, when production of that gas might jeopardize recovery of the underlying bitumen. The EUB's logic is that the raw energy content of the bitumen being protected – measured on an 'oil equivalence' basis – greatly exceeds that of the "associated" gas.[88]

What the "Conservation" Objectives Don't Cover

As noted above, there are questions as to whether all of the historical oil and gas "conservation" objectives fit within the legislative concept of "conservation". Putting these questions aside, there are additional questions as to why these historical objectives have been pursued and who have they been supposed to benefit. Before attempting to answer these questions, it is worth clarifying several limitations in the scope of the objectives or, in other words, what the objectives do *not* purport to cover.

First, "conservation" is not described as having been intended to maximize *net* energy output *per se* – *i.e.*, energy output minus energy inputs needed to generate that output.

The *OGCA* is the only statute among the four that expressly aims to protect correlative rights. *OGCA*, s. 4(d) (aiming to "afford each owner the opportunity of obtaining the owner's share of the production of oil or gas from any pool").

[87]Thus, Govier's characterization of all of these objectives as the "three main conservation objectives" (Govier, *supra* note 78 at 342), is inconsistent with the Legislature's separate references to "conservation" and the other objectives in the Acts' purpose sections. The Board itself has referred to these two functions in separate breaths. See ERCB, *Conservation in Alberta – 1971* at 4 (listing "Conservation" and "Protection of Correlative Rights" as distinct functions within an overall role of "Management of Energy Resource Development").

[88]See Michael Wenig, "Valuing Energy Resources" (Fall 2002) 80 Resources 1. For a critique of 'oil equivalence' as a criterion for comparing energy values in other contexts, see M.A. Adelman & G. Campbell Watkins, "Costs of Aggregate Hydrocarbon Additions" (June 2004) 25 The Energy J. 37-51; and Dr. John Lohrenz, "*In Situ* Gas To Oil Equivalence 6 MCF/Barrel? Aw C'mon?" (December 1998) 6 Dialogue (U.S. Ass'n for Energy Econ.) 8-11.

Notably, the Alberta Court of Appeal has upheld the EUB's resolution of the 'gas over bitumen' conflict under the Board's broad "conservation" mandate, notwithstanding the Legislature's removal of provisions that would have specifically authorized the Board's action. *Giant Grosmont*, *supra* note 15 at 263. This decision was not unanimous, however. One dissenting Justice concluded that the EUB's decision to "protect one [energy] resource to the detriment of another" was a "major policy decision" that could not "wholly be justified by the legislative objective of [conservation and] waste prevention." *Ibid.* at 277, Conrad J.A.

Nor is it meant as a goal to minimize the full, life-cycle costs of energy production.[89] This said, there are ongoing attempts to account for and reduce the life cycle costs of "conservation" activities. For example, a provincial cabinet regulation offers limited royalty credits for oil and gas producers who use CO_2 in place of water for enhanced recovery operations.[90] And oil sands operations are being assessed from life cycle standpoints using assessment methodologies that are being increasingly refined.[91] However, more work is arguably needed to not only perfect life cycle assessment methods but also to fully incorporate their results in regulatory and policy decisions.[92]

Second, upstream oil and gas "conservation" has not been viewed as contingent upon, or as a function of, the implementation of downstream energy conservation policies. This non-linkage was observed forty years ago by Lovejoy and Homan who noted that, in the "petroleum industry and among state [petroleum] regulatory agencies, the end-uses to which petroleum is to be put are almost completely excluded from discussions of conservation." In fact, the authors concluded with some regret that there was "something approaching a dogmatic taboo against mentioning the subject" of downstream end-uses in the context of upstream "conservation".[93] This said, all three fossil fuel "conservation" statutes include provisions for the EUB's regulation (through an "industrial development permit" program) of the downstream use of fossil fuels by large-scale industrial and manufacturing operations. However, the upstream and downstream energy "conservation" provisions are functionally linked in these statutes only in the sense of being contained in the same statutory texts.[94]

Third, "conservation" does not seem to guide considerations of equitable or otherwise appropriate allocations of *all* conventional oil and gas reserves between present and future generations.[95] Finally, the three historical "conservation" objectives are related to,

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[89]See generally, *e.g.*, Wenig, *ibid.*; see also, *e.g.*, *BP Canada Energy Co. v. Alberta (EUB)*, (2004) 27 Alta. L.R. (4th) 234 at 249, Wittmann J.A. (in denying the associated gas producers' request to stay the EUB's decision to shut in the associated gas wells, concluding that the "balance of convenience is clearly in favour of the public interest" in shutting in the gas wells, because the energy content of the bitumen is 600 times that of the shut-in gas production).

[90]*CO_2 Projects Royalty Credit Regulation*, A.R. 120/2003.

[91]See Joule Bergerson & David Keith, *Life Cycle Assessment of Oil Sands Technologies* (Calgary: ISEEE, 2006).

[92]Wenig & Ross, "Bringing Life to *Life Cycle Assessments*", *supra* note 25.

[93]*Supra* note 18 at 11.

[94]See *OGCA*, s. 43; *OSCA*, s. 12; and *CCA*, ss. 28-31. For information on this permit program, see EUB, *Directive 025 – Industrial Development Permit Applications to the ERCB* (September 1981); see also CELS, *supra* note 73, Part 25; and D.J. Jenkins, "Industrial Development Permits" (1979) 17 Alta. L. Rev. 467-496.

[95]See Lovejoy & Holman, *supra* note 18 at 10-16; but see Scott, *supra* note 45 at 26 (noting that conservation objectives in the 1920s included retaining resource stocks for future use).

but distinct from, considerations as to whether a jurisdiction-wide production *rate – i.e.*, the amount produced today versus the amount left in place for future production – will maximize the jurisdictional owners' *rents* in light of current and future resource prices, interest rates, and technology and other factors bearing on production costs and reserve discoveries. How these factors bear on socially optimal production rates is a central question for natural resource economists.[96] And while economists have occasionally referred to this production rate question under the broad rubric of "conservation",[97] this topic does not seem to have been relevant to government decision-making under oil and gas "conservation" programs. For example, maximizing rents is a central consideration in the province's current review of its oil and gas royalty regime, but that exercise is not considered a "conservation" function.[98]

In Search of a Unifying Theory

With these limitations in mind, we return to the central question of why historical oil and gas "conservation" programs have sought to maximize recovery (on a gross, rather than

[96]See, *e.g.*, David W. Pearce & R. Kerry Turner, *Economics of Natural Resources and the Environment* (New York: Harvester Wheatsheaf, 1990), Part IV, Ch. 18. (Two of the seminal papers on this topic are: Harold Hotelling, "The Economics of Exhaustible Resources" (1937) 39 J. Political Economy. 137-175, and Ronald Coase, "Durability and Monopoly" (1972) 15 J. Law & Econ. 143-149. The former paper posits a simplified production under competitive markets; the latter addresses optimal production rates under non-competitive or monopolistic scenarios.) In its simplest terms, the optimal production rate question turns on whether the "present value" of harvesting a resource in the future is greater than the value of harvesting the resource today. The answer to this question turns, in part, on the interest that could be earned on the revenue from harvesting the resource today. The rate of interest or earnings is commonly termed the "discount rate". Hence, "discounting" is the process of finding the present value of an amount of cash at some future date. If based on market rates, the discounting process is concerned solely with maximizing revenue over time and, thus, ignores other social costs and benefits which are relevant to government policy makers. Thus, considerable effort has been made to develop non-market or "social" discount rates so that the discounting tool can be of better use for policy makers.

[97]See *infra* note 99 and references in Odumosu, *supra* note 44 at 30 and n. 122.

[98]See *Alberta Royalty Review*, online: <http://www.albertaroyaltyreview.ca>. For another example, in deciding to shut-in associated gas wells in order to "conserve" a bitumen deposit, the EUB expressly eschewed the gas producers' request that the two resources be compared according to their net present values, while at the same time the Board avoided second-guessing the bitumen producers' desired production schedule, which was a critical factor in those net present value calculations. See Wenig, "Valuing Energy Resources", *supra* note 88 at 3. A more recent example is Alberta Premier Ed Stelmach's emphatic "reject[ion]" of calls for the province to "'touch the brake'" on high rates of economic growth, based on his reasoning that "bad things happen" when "government attempts to manipulate the free market". Ed Stelmach, "Speaking notes" for speech presented to the Canadian Association of Petroleum Producers (CAPP), *Oil and Gas Investment Symposium* (19 June 2007), online: <http://www.premier.alberta.ca/speeches/speeches-2007-june-19-CAPP.cfm>. Given the audience for this comment, and the central role of oil and gas production in Alberta's economy, the Premier's expressed aversion to slowing growth generally is an implied aversion to tampering with market-based oil and gas production rates, in particular.

net energy output basis), protect correlative rights, and promote production efficiencies. In answering this question, it is worth considering whether there is a single or unified principal or definition of "conservation" that can be gleaned from the historical record. There have been attempts to articulate an unambiguous "conservation" concept but their success is questionable. Thus, for example, U.S. economists Lovejoy and Holman referred to the "looseness and vagueness" of the "conservation" concept that has been articulated in "industry circles".[99] Writing in the 1970s, Canadian economist Anthony Scott opined that "conservation" involved "using the results of research into the most profitable methods of production so that no oil which might return a good profit is lost."[100] This concept of "conservation" shows that economists themselves were not immune to providing "loose" and "vague" concepts of "conservation", because Scott's concept is utterly ambiguous as to the relative roles of governments and markets in determining appropriate production practices and outputs.

Putting aside scholars' attempts to synthesize a unifying theory of oil and gas "conservation", what theory has the EUB applied in carrying out its broad regulatory discretion under the fossil fuel "conservation" statutes? The answer is unclear, in part, because the Board does not appear to have ever articulated an abstract theory and logic of "conservation".[101] Former EUB member George Govier has provided an often-referenced explanation which lumps the concepts of "efficiency" and "economically avoidable" waste with notions of protecting the interests of future generations and waste elimination in general.[102] This explanation has appropriately been described as an ambitious attempt to "blend … traditional conservation philosophy, insights from practical engineering experience, and economic theory".[103] However, it hardly provides a uniform underlying abstract theory from which regulatory approaches in varying petroleum and non-petroleum energy resource contexts can be logically derived. In his landmark history of the EUB, Breen noted that petroleum "conservation" regulations "did not emerge full-

[99]*Supra* note 18 at 26. In making this criticism, the authors contrasted the various industry definitions with the authors' own self-described "precis[e] and narro[w]" view of "conservation" in economic efficiency terms – *i.e.*, in the sense of maximizing net present value of resource production over time. However, while the authors felt this approach was not being sufficiently applied in real world "conservation" programs, they admitted that other factors were also relevant to "conservation" decisions, but they did not offer a "conservation" definition that purported to unambiguously encompass all relevant factors. See *ibid.*, chs. 1, 3 and 9.

[100]Scott, *supra* note 45 at 26.

[101]This conclusion is based on a search of EUB policy statements published outside of the context of specific quasi-judicial adjudications. However, further research of EUB decisions in those adjudications would be useful to see what if any "conservation" theories have been articulated in them or could be implied from their outcomes.

[102]See Breen, *supra* note 76 at 3 (reference omitted); and Ken Banister, *A New View of Conservation: The Sustainable Development of Energy Resources in Alberta* (May 2003) at 9 [unpublished].

[103]Breen, *ibid.* at 3.

blown from a solidly constructed theoretical foundation."[104] Nor does it appear that the EUB has ever developed such a foundation after the fact.

Preliminary research suggests that, besides not articulating a foundational "conservation" theory, the Board has shifted over time in its views as to the principle's implications. An illustrative example of this shift is the EUB's policy for conserving 'solution gas' which is gas that exists in solution with crude oil in a reservoir but separates from the oil during production. For a period up to the late 1990s, the Board believed that 'solution gas' should be "conserved" – *i.e.*, recovered and put to use, rather than flared or vented to the atmosphere – only when this approach was cost effective from the industry's own cost-benefit standpoint.[105] By contrast, the EUB currently decides whether solution gas should be "conserved" based on a cost-effectiveness standard that is not driven by the industry's own financial bottom line.[106] The fundamental nature of this shift from the industry to the public's perspective of cost effectiveness supports Breen's conclusion, noted above, that the Board's "conservation" programs have not been premised on a strong underlying theoretical foundation.[107]

The "Conservation" Objectives and the "Public Interest"

The absence of a single theory underlying the three historical "conservation" objectives makes it difficult to assess how those objectives are intended to serve the broader "public

[104] *Ibid.* at 4.

[105] According to the Board, it generally intervened in this industry-focused cost calculation only when necessary: to ensure consistency among different firms that might draw different conclusions from the same costs; to account for "conservation" techniques that would be cost-effective under scenarios of intra-firm cooperation that competitive firms might not undertake on their own; or, due to overriding "public interest" concerns. EUB, *Policy Review*, *supra* note 56 at 15-16.

[106] More specifically, the Board currently requires the "conservation" of solution gas even if the 'net present value' of a method for recovering and reusing the gas is below $0, and thus not cost effective to a producer, provided that the net present value is -$50,000 or more. EUB, *Directive 060 – Upstream Petroleum Industry Flaring, Incinerating, and Venting* (revised 16 November 2006), part 2.8.

[107] The EUB's rule change was apparently spurred by a recommendation made by a working group of the multi-stakeholder Clean Air Strategic Alliance. The group's report provides scant explanation for the recommended net present value threshold for conserving sour gas except to suggest that it resulted essentially from a compromise. This is evident from the group's explanation that it "recognizes there will be cases where conservation is not economically feasible. Industry, however, recognizes the value in marginally uneconomic sites conserving solution gas. As such, all sites with a net present value greater than negative $50,000 will be required to conserve." CASA Flaring and Venting Project Team, "Gas Flaring and Venting in Alberta – Report and Recommendations for the Upstream Petroleum Industry" (CASA, 2004) at 14. The EUB's reliance on the CASA multi-stakeholder compromise may or may not reflect 'good' decision-making from a democratic participation standpoint. The point here is simply that the CASA recommendation itself does not appear to stem from a unified, coherent theoretical foundation of "conservation".

interest", but does not preclude that inquiry altogether. The following are several thoughts on this "public interest" connection.

First, two of the three historical "conservation" objectives – protecting correlative rights and promoting efficient production – if not also the third objective of maximizing production, are likely aimed in the first instance at promoting the profitability or health of the oil and gas sector as a whole. The means for achieving this profitability objective, in turn, is essentially to protect the sector against the harms any one of its members might inflict on itself and on the other members through their naturally competitive responses to the 'rule of capture'. While questions have been raised about how the public as a whole benefits from those protective measures,[108] the case can at least be made that any benefits to the oil and gas industry inure *indirectly* to the public as well, based on the logic that the overall economy thrives when the oil and gas sector is healthy.[109] (In the 'gas over bitumen' context, some producers are benefited while others lose out, although compensation regimes are intended to cover those loses.) To the extent it has really been applied, the upstream production efficiency objective may also have direct benefits for the general public, but even the nature of the actual public benefit has been questioned.[110]

Whether it helps the profitability of the oil and gas sector itself, the historical "conservation" objective of maximizing production also seems to have a more direct line to the "public interest". That connection is based on a notion that it is simply wrong, from some fundamental or moral standpoint, to 'strand,' 'sterilize,' or otherwise render unusable a natural resource that has no apparent social utility *in situ*. Thus, Lovejoy and Holman note that "many economists would agree" that "conservation" is "more a movement and an ethic for avoiding waste in some physical sense than a mere extension of the economic theory of optimum allocation of resources between uses and through time."[111] The authors themselves characterize it is a "puritan directive not to 'waste' our

[108]See, *e.g.*, Sychuk, *supra* note 44 at 358 (noting that "one of the strongest criticisms of the conservation program is that conservation does not promote public welfare but is a private price maintenance scheme.") and *ibid*. at 362 (quoting another scholar's conclusion that conservation regulations have "'done both economic good and harm in the past and may do so in the future'") (citation omitted).

[109]See Breen, *supra* note 76 at 4 (noting, as an objective underlying "conservation" regulation, the "compelling desire to maintain a healthy domestic producing industry to sustain the local or regional economy."). See also, *e.g.*, Mansell & Schlenker, *supra* note 3 at 50 (noting that the EUB's focus on "conservation" and ensuring "economic, efficient and orderly development in the public interest" has served the province "extremely well"); and Lovejoy & Holman, *supra* note 18 at 22 (noting that programs designed to minimize over-investment reduce both social and firm-specific production costs) and at 29 (acknowledging the notion that a strong domestic producing industry has the public benefits of supporting local and regional economies through employment and income, provides tax revenues, and contributes to national security).

[110]See Odumosu, *supra* note 44 at 33 (noting the public interest factors that aren't addressed by efficiency considerations).

[111]*Supra* note 18 at 25.

God-given resources".[112] As applied in the 'gas over bitumen' context, the corollary to this moral notion seems to be that it is immoral to sterilize one energy resource by allowing production of another resource that has a far lower raw energy value.

In either context, the moral notion is intuitively appealing but only at first blush. This appeal diminishes when, as explained above, the "conservation" imperative is exercised without consideration of the full, life cycle costs of maximizing production (or of maximizing output on an oil equivalence basis). In simple terms, it may not be wrong to forego producing the last drop of oil or gas from a given pool, or even a larger or significant percentage of that remainder, if the social costs of that marginal production – *e.g.*, costs arising from production and consumption of other natural resources needed to maximize production of a given oil or gas pool – are greater than the social benefits.[113]

Of course, just because full life cycle costs seem to be excluded from historic "conservation" objectives doesn't mean the EUB has to ignore them in making decisions under the *ERCA*, even if the Act's "conservation" mandate is generally construed according to the term's historic usage. As listed in the *ERCA*'s purpose section, energy resource "conservation" is but one of several legislative purposes; several of the Act's other purposes – including environmental conservation and efficiency – could be interpreted to encompass full cost, life cycle considerations of energy developments. In addition, the Act's "public interest" standard for the EUB's review of proposed energy projects also arguably embraces full cost, life cycle considerations, because those factors are arguably implicit in both the broad nature of the "public interest" concept and in the Act's express requirement that the EUB consider social, economic, and environmental factors in making its "public interest" decisions.[114]

However, if energy resource "conservation" is nevertheless viewed as the EUB's chief or primary mandate (as noted in Part 1 above), historic conservation objectives may trump all other "public interest" considerations in practice. The EUB's reliance on the

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[112]*Ibid.* at 25, n. 16.

[113]The use of cost/benefit terms here is meant only in a broad, qualitative sense and presuming that the moral aversion to leaving oil and gas *in situ* is qualified rather than absolute in nature. More precise, quantitative cost-benefit analyses (that reflect full social costs that are not reflected in market prices) may or may not be appropriate in determining whether the moral aversion should guide pool-specific production decisions.

[114]Unlike the *ERCA*, each of the three fossil fuel conservation acts refers to promotion of the "public interest" in its list of threshold purposes. These express "public interest" references have a broader application than that in the *ERCA*, in the sense that they implicitly apply to all EUB decisions under those acts whereas the *ERCA*'s reference to the "public interest" is tied specifically to the EUB's review of a "proposed energy resource project". See *OGCA*, s. 4(c); *OSCA*, s. 3(b); *CCA*, s. 4(c); and *ERCA*, s. 3. However, those three acts' "public interest" reference is in just one of several legislative purposes so, under a literal reading of these purpose provisions, the "public interest" is not a 'bottom-line' kind of consideration that encompasses all others.

"conservation" principle as a basis for resolving the 'gas over bitumen' dispute suggests that this is the case, at least, in those contexts where "conservation" issues arise in the first instance.[115] The narrow scope of issues typically addressed in oil and gas "conservation" literature also suggests that full cost, life cycle considerations have generally been excluded in other oil and gas "conservation" contexts, although further research is needed to confirm this finding. And, as noted above, there is increasing use of life cycle assessments in oil sands contexts, even if not for guiding specific "conservation" decisions.

In sum, there is an extensive historical record – from industry, government, and scholars – of oil and gas "conservation", but the record is problematic for discerning a coherent meaning of the term as used in the *ERCA*. This is due, in part, to the apparent lack of a coherent, unified, underlying "conservation" theory. And while several "conservation" objectives are commonly referenced, they are not consistently embraced under the "conservation" banner and may not fit within the legislative use of the term. Finally, the objectives are limited in scope or focus and, thus, their linkage to the broader "public interest" is hardly clear. Under these circumstances, "conservation" may be more of a label for regulatory policies that the EUB itself develops, than a legislative guide for the Board's decision-making. This scenario is difficult to accept, however, because it would render the *ERCA*´s "conservation" objective virtually meaningless.

6.0. Implications of the Fossil Fuel "Conservation" Statutes and "Conservation" History for Renewable Energy

Do the legislative and historical meanings of fossil fuel "conservation" shed any additional light on the *ERCA*'s implicit call for "conservation" of renewable energy resources? Perhaps not, given the ambiguities in the fossil fuel "conservation" record discussed in Parts 4 and 5 above. The fossil fuel "conservation" experience may not be transferable to renewable energy for the additional reason that the problems that prompted the design of oil and gas "conservation" programs seem unique to oil and gas development. And the prominent oil and gas "conservation programs" – *e.g.*, maintaining reservoir pressure, limiting flaring, and shutting in gas associated with bitumen – do not seem to have ready analogs in the renewable energy sector. From a broader standpoint, perhaps "conservation" is simply less of a concern for renewable energy sources given the inherently renewable nature of their energy flows.

One the other hand, the fossil fuel "conservation" experiences arguably reflect a basic legislative recognition that market values of energy resources are not necessarily an

[115] Wenig, "Valuing Energy Resources", *supra* note 88.

accurate benchmark of those resources' full social values. The broad lesson from these experiences is that government intervention and the establishment of standards and definitions is needed to identify and uphold those non-market values or, in other words, to address the externalities in energy markets. By generally calling for energy resource "conservation", the Alberta Legislature is thus Scott's "conservationist (that is, anyone who would raise the degree of conservation,)" who believes that the "profit-maximizing activities of individuals and of firms cause the allocation of resources to be imperfect, and that the maximization of social satisfaction, or whatever is the social aim, is impossible without government interference."[116] This "conservation lesson" is just as if not more applicable to renewable energy sources as to non-renewable sources, whether or not the social objectives for fossil fuel development, and the problems arising from that development, are identical to those relating to non-renewable energy production.

Besides the broad applicability of this very general notion of "conservation", there may well be other, higher 'common denominators' linking fossil fuel and renewable energy "conservation". For example, the efficiency and equity objectives underlying the historic oil and gas "conservation" programs could just as well serve as objectives for government management of renewable energy, although it is unclear whether there are any pressing needs for government action to further those objectives in the renewable energy context. Likewise, the moral aversion to waste that likely underlies the fossil fuel conservation programs is not inherently limited to fossil fuel energy. However, the applications of this moral principle for renewable energy vary depending on whether one is concerned solely with the renewability of energy flows or also with the actual energy potential of those flows and consequently the ability to diminish reliance and thus "conserve" other scarce sources of energy.

If the moral aversion to waste extends to energy flows *per se*, then it is not difficult to envision renewable energy "conservation programs" to prevent that waste. Examples of such programs include government requirements or incentives for: building developers to install solar photo-voltaic systems; feedlot operators to capture and use or sell methane from anaerobically digested livestock manure; and lumber mill operators to use sawdust to produce biofuels. Each of these "conserved" energy sources – solar radiation, manure, and sawdust – is analogous to the portion of an oil reservoir that would be wasted without government inducements to prevent that waste. Of course, there are economic and technical constraints on how much of various renewable energy flows can reasonably be tapped, but the same can be said for how much oil and gas to "conserve". Hence, oil and gas conservation programs are legislatively constrained by "sound engineering and economic principles", among other similar standards, as noted in Part 4 above in discussing the *OGCA*'s definition of "wasteful operations". We can debate the *content* or

[116] *Supra* note 45 at 36; see also *ibid.* at 53 (noting that the "conservationist believes that the maximum social benefit is not achieved by each individual's maximizing his private benefit, because there are certain social benefits to be derived from conservation which are not appreciable to the individual business.").

meaning of these standards – *e.g.*, whether they should reflect externalities and other market shortcomings – but at a basic level they are just as appropriate for designing renewable energy conservation programs as for oil and gas conservation.

What programs, if any, are warranted to uphold the moral aversion to waste in the context of "conserving" the *renewability* of energy flows? The answer differs depending on the kind of renewable energy sources being considered. Some so-called renewable energy sources exist solely due to human activities – *e.g.*, crop residues and livestock manure. It seems nonsensical to design programs to ensure the continued supply of those agricultural 'waste products' for their own sake – *i.e.*, above and beyond programs to generate the agricultural products themselves – but that logic may simply depend on the relative values of the agricultural wastes and the products that generated them. Then again, simply recognizing the full values of those agricultural wastes as energy sources (among other possible values) may serve to perpetuate their future supply. Crops themselves are in increasing demand as feedstock for biofuels, so farm subsidies and other programs that promote agricultural production could be considered to help "conserve" the future supplies of those renewable energy sources (and, indirectly, of energy-bearing agricultural residues).[117] Conserving the renewability of naturally occurring biological sources of renewable energy – *e.g.*, forests and grasslands – might look much like environmental conservation programs targeted at those regions, with some kind of "sustained yield" principle governing the rate of harvesting for energy or other consumptive purposes.

Non-biological renewable energy sources are renewable without human intervention. And given the plenitude and nature of these resources, their 'harvest' by humans generally does not need to be managed by "sustained yield" or analogous principles to ensure their renewability. This said, human actions can diminish flows of non-biological energy resources, at local, regional, and perhaps even global scales. Thus, programs to protect the renewability of these flows – *e.g.*, building restrictions to ensure solar access; limits on water diversions from flowing streams; protection for wind resource areas –

[117]To be clear, the aim here is simply to assess whether oil and gas-type "conservation logic" can be applied to, or has any meaning for, the renewable energy sector. Thus, the above theorizing on biofuel "conservation" is made without respect to the full cost, life cycle considerations of various biofuel sources and technologies, because those same considerations have been excluded from oil and gas "conservation" programs, as discussed in Part 5 above. However, those full cost, life cycle considerations may well be significant. Corn-based ethanol is particularly illustrative here. For example, there is considerable concern that increased incentives for this fuel as a substitute for fossil-fuel has created a corresponding price increase for corn and strained supplies of corn otherwise used to feed livestock or for primary food sources (such as for production of tortillas in Mexico) and accordingly raised the prices of those corn-based foods. Given these and other concerns, full cost, life cycle assessments should inform government decisions (to the extent possible given the limits of state-of-the-art assessment methodologies) as to whether and how much to support biofuels. Of course, biofuels are not unique among energy sources and technologies that should all be scrutinized under full cost, life cycle assessment lenses. See Bergerson & Keith, *supra* note 91 and Wenig & Ross, *supra* note 25, respectively.

could fit within a broad energy resource "conservation" portfolio. In fact, to the extent global warming will affect regional availability or variability of wind and solar radiation, programs to limit greenhouse gas emissions could also be justified under the energy resource "conservation" rubric.

In short, the legislative and historical records of fossil fuel conservation provide several principles that have analogous applications for renewable energy. The scope and nature of those applications are hardly certain, but the same can arguably be said for their application to fossil fuels. Thus, just as Alberta has built extensive programs to maximize the benefits of oil and gas production under the banner of oil and gas "conservation", so could the province develop renewable energy "conservation" programs. California provides an example of another jurisdiction which has assigned a "conservation" agency – the California Energy and Resources *Conservation* Commission (CEC) – with the job of promoting renewable energy development. The Commission counts, among its "major responsibilities", the "support of renewable energy" through various market-based programs aimed at promoting existing, new, and "emerging" renewable energy sources.[118]

7.0. The Future for "Energy Resource Conservation"?

To summarize the analysis thus far, the *ERCA* starts with a blanket call for the "conservation" of all "energy resources" but then fails to back this up with a concrete definition of "conservation" and detailed provisions to implement the objective. This shortcoming is ameliorated somewhat for fossil fuels because of the accompanying fossil fuel "conservation" statutes and the extensive history of conservation programs for those sectors. However, fossil fuel "conservation" remains a mysterious concept even with those supplementary guides. As two U.S. "conservation" scholars commented several decades ago, the wide range of state regulatory programs that were subsumed under the "conservation" rubric "diffuses the term into an almost meaningless coverage incapable of definition."[119] Similarly, Breen concluded that the widespread "general usage" of the

[118]CEC, "Welcome to the California Energy Commission", online: <http://www.energy.ca.gov/commission> and "Renewable Energy Program", online: <http://www.energy.ca.gov/renewables/index.html>. See also CEC, "History of the Renewable Energy Program", online: <http://www.energy.ca.gov/renewables/history.html>. While not expressly linked to upstream energy "conservation", the New York State Energy Research and Development Authority is another example of an energy agency with a major responsibility for promoting renewable energy. For information on the Authority's various renewable energy programs, see online: <http://www.powernaturally.org>.

[119]Lovejoy & Homan, *supra* note 18 at 6; and *ibid.* (noting that the term "is used with different meaning by different people inside and outside the petroleum industry") and at 26 (noting that "conservation" "cannot be defined" through its use by the petroleum industry and regulators).

term "conservation" in the upstream oil and gas regulatory context renders the term "almost incapable of specific definition."[120]

The picture is even blurrier for renewable energy sources, which lack their own "conservation" legislation or historical programs. However, the record of fossil fuel "conservation" provides general principles that could apply to the renewable energy sector, although the actual contexts for applying these "conservation" principles are unclear.

This overall picture strongly suggests that legislative reform of the *ERCA*'s "conservation" mandate is warranted. But what kind of reform is needed and to what end? Should the Legislature simply narrow the application of the *ERCA*'s "conservation" objective to only non-renewable energy resources?[121] Alternatively, should the Legislature adopt supplementary renewable energy conservation legislation like those for fossil fuels? Is "conservation" the right legislative policy to guide the upstream development of any kind of energy resource?

This paper does not have definitive answers to these questions, but the following points are intended to at least help in answering them. First, the *ERCA*'s application of its "conservation" objective (as well as its other threshold objectives) to *all* "energy resources" provides an implied legislative directive that provincial energy policies and programs should reflect a comprehensive, holistic focus. This legislative directive makes sense, in part, under the general rule that risks are best managed through diverse portfolios.[122]

The *ERCA*'s broad, threshold focus on all "energy resources" is warranted for the additional reason that it is illogical to even think about 'conserving' one energy resource without thinking about how that effort relates to the availability and use of other energy resources. For example, to the extent that use of renewable energy reduces consumption of non-renewable resources, the former could be considered a tool for "conserving" the latter.[123] This linkage is evident in the more abstract sense that the moral aversion to

[120]*Supra* note 76 at 1.

[121]The Constitution of Canada provides an example of a more narrowly targeted application of the "conservation" principle, by referring to provincial legislative authority with respect to the "conservation" of "non-renewable natural resources and forestry resources" and of electricity production facilities located within their borders. *Constitution Act, 1867*, ss. 92A(1)(a) and (c).

[122]See, *e.g.*, Mansell & Schlenker, *supra* note 3 at 54 (recommending that Alberta apply "established principles and tools for risk and portfolio management in handling its natural resource endowments").

[123]This linkage is arguably implicit in the province's 2002 climate change policy, which contains an "energy conservation" initiative that includes taking steps to promote renewable energy. Government of Alberta, *supra* note 48 at 29. See also Scott, *supra* note 45 at 31 (noting that the "conservation of one stock resource is likely to accomplish the conservation of others.").

waste of fossil fuel resources is likely inherently tied to economic and technical limits to society's ability to harness renewable energy sources on a widespread basis. In other words, we feel a moral compulsion to "conserve" or not "waste" fossil fuels only because their cost and feasibility of production are attractive relative to those of other energy substitutes, including renewable energy. (Then again, if the moral aversion to waste discussed in Part 5 above is inapplicable to energy from sources that can be renewed and presumably tapped in the future, then perhaps those future renewable flows should also negate a moral aversion to wasting non-renewable energy sources.)

The importance of holistic considerations of energy resources has long been recognized. For example, forty years ago U.S. economists Lovejoy and Holman called for a holistic approach in considerations of whether limits should be imposed on rates of use of particular energy sources and they lamented the absence of agencies responsible for taking an "integrated analysis" of energy and non-energy resources.[124]

Likewise, Canadian energy economists Mansell and Schlenker recently wrote that "various energy paths are not independent but, rather, have systematic negative or positive covariance tendencies." From this fact, they conclude with "little doubt" that the "largest gains [in social welfare] will come from an ability to integrate energy types … Rather than view each energy type in isolation, it seems far more productive to consider the richness of combinations."[125] The *ERCA*'s holistic threshold focus on all "energy resources" implicitly recognizes their covariant tendencies and supports the multi-energy, system-wide approach recommended by these economists.[126]

The province's recent "Integrated Energy Vision" also supports an energy systems approach that is implicit in the *ERCA*'s holistic focus on all "energy resources".[127] Ironically, the province's plan to split the EUB into two separate agencies focused on fossil fuel and electricity may create government decision-making 'silos' that could frustrate an integrated energy systems approach. However, perhaps this effect could be prevented or diminished if the two agencies were still required to coordinate their decisions under a single, holistic energy statute.

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[124]Lovejoy & Holman, *supra* note 18 at 15.

[125]Mansell & Schlenker, *supra* note 3 at 55. See also Wenig & Ross, "Making Progress", *supra* note 25 (discussing the value of the energy system focus in Alberta's 2006 "Integrated Energy Vision"); and Henrik Lund, "Renewable energy strategies for sustainable development" (2007) 32 Energy 912 at 917 (noting that "designing integrated energy system solutions" is a key step toward developing "sustainable energy strategies").

[126]As an example of these tendencies, a recently proposed long distance DC transmission line to Alberta's oil sands might, in turn, open up access for hydroelectric operations based farther north. See M. Moore & R. Schlenker, *The Missing Link: An Evaluation of the Proposed Northern Lights Transmission Project* , Alberta Energy Futures Project Paper No. 13 (Calgary: ISEEE 2006) at 2.

[127]Wenig & Ross, "Making Progress", *supra* note 25.

While it seems appropriate to retain the *ERCA's* threshold focus on both non-renewable and renewable energy sources, the question remains whether the Legislature should adopt renewable energy "conservation" legislation in order to level the *ERCA's* "conservation" 'playing field' between renewable and non-renewable energy resources. Given the diversity of renewable energy sources and of the contexts in which they can be produced, that legislation would either need to be wide ranging or segmented into different statutes for different renewable energy sources. Of course, many current statutes already provide for the regulation of different renewable energy sectors by provincial and municipal agencies.[128] Thus, an additional question is whether that regulatory authority should be consolidated under a single renewable energy "conservation statute" implemented by the EUB or some other regulator in order to streamline the overall regulatory burden on renewable energy sectors and to ensure that provincial interests in promoting renewable energy are adequately reflected in regulatory decisions affecting those sectors. Once again, it is ironic that, while the province has endorsed an "integrated energy" approach, its more recent initiative to split the EUB into two energy regulatory agencies would appear to have the opposite effect and may delay the integration of new renewable energy resources into the provincial energy mix.

Whether or not renewable energy "conservation" legislation is needed to level the "conservation" playing field, the "conservation" mandate should itself be seriously reconsidered in all its applications. Besides the uncertainties as to what it means in various upstream energy resource contexts, the concept's apparent preclusion of full cost, life cycle, system-wide considerations, as discussed in Part 5 above, severely limits its utility as a guide for government decision-making. Put simply, "conserving" energy resources in the historical oil and gas conservation sense really misses much of the point. Or, in more reserved terms, natural resource "conservation" in general "should not be regarded as a movement which has the answer to every question."[129] Thus, "conservation" should be re-defined or, more accurately in the *ERCA*'s case, newly defined, to reflect full cost, life cycle, and system considerations.[130] Alternatively, perhaps the *ERCA*'s "conservation" provision should be retired altogether in the upstream energy context – while credited for spurring needed responses to the 'rule of capture' – and replaced with a new mantra for a more holistic, system-based approach to contemporary social needs. "Integrated energy", as expressed in a 2006 provincial "vision" statement, and "energy sustainability" are two terms that might fill this legislative void, but they too should be supported by reasonably clear definitions and implementing provisions.

[128]For an overview of this legislative framework, see ISEEE Report, *supra* note 1, ch. 2.

[129]Scott, *supra* note 45 at viii.

[130]For a discussion of this kind of reform, see Banister, *supra* note 102.

As noted at the outset of this paper, the Premier's commitment to develop a "comprehensive energy strategy" provides a useful policy-making context for the province to carefully re-think its long-held "conservation" mandate. However, the present push to split the EUB would seem to provide the Alberta Legislature with an even more immediate and ready, and arguably necessary, context for doing so. While not touching the "conservation" mandate directly, Bill 46 amends the *ERCA* in several other respects and, thus, has put the *ERCA* squarely on the Legislature's radar screen. But more fundamentally, the Legislature should carefully consider the mandates of any successors to the EUB before creating them by adopting Bill 46. And finally, if adopted in its current form, Bill 46 will exacerbate the *ERCA*'s current gap between its implicit call for renewable energy "conservation" and its lack of provisions to actually implement that objective.[131] This potential worsening of the existing legislative error provides yet another impetus for the Legislature to re-assess the *ERCA*'s "conservation" mandate in the Legislature's further consideration of Bill 46. While Bill 46 provides several ready and compelling excuses for this "conservation" reassessment, to date the Legislature has not seized this opportunity.

[131]As discussed in Part 3 above, the EUB's principal authority with respect to "power plants" stems from the *Hydro and Electric Energy Act*. The Board's decision-making under that legislation is tied – albeit indirectly and tenuously – to the *ERCA*'s purposes, including the "conservation" mandate. Bill 46 does not touch the *ERCA*'s energy resource "conservation" mandate (or the Act's broad definition of "energy resources"), but the Bill would distribute the EUB's current regulatory authority with respect to "power plant" approvals to a Public Utilities Commission whose authority, under the Bill, is completely severed from the *ERCA* and not otherwise tied to a new "conservation" provision. See Bill 46, ss. 14(b) and (g).

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