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Oil Sands, Carbon Sinks and Emissions Offsets: Towards a Legal and Policy Framework

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Executive Summary

The development of Alberta's oil sands will result in significant greenhouse gas (GHG) emissions. This paper summarizes the implications of this development for Canada's emissions profile and reviews briefly the rationale for biotic carbon sequestration as a means of offsetting GHG emissions. The paper then turns to eight important issues for sinks-based offsets. These issues are: (1) the legal foundation for biotic carbon sequestration; (2) the risk of project failure and leakage; (3) monitoring and verification; (4) market intermediaries; (5) environmental risks; (6) land-use conflicts; (7) the alignment of regulatory requirements, policies and incentives; and (8) collateral benefits and strategic objectives. While some of these issues were identified in the federal and Alberta climate change plans released in 2002, these plans fall far short of establishing a comprehensive legal and policy framework for sinks-based offsets. The paper concludes by arguing that this framework should include carbon rights legislation, a regulatory and certification regime, and non-market mechanisms to increase biotic carbon sequestration. The promotion of sinks-based offsets should also occur as part of an integrated approach to resource and environmental management.

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1.0 Introduction

Oil sands in Alberta are an important part of Canada's energy future. Enormous hydrocarbon reserves, active promotion of this energy resource by the federal and provincial governments, multi-billion dollar private sector investments, ongoing technological advances in production methods, and projections of increasing domestic and U.S. demand all point to dramatic increases in crude oil output from oil sands over the coming decades.

The economic benefits of this development are obvious, but attention is also focusing on the environmental costs. Some of these costs relate to greenhouse gas (GHG) management. Since oil sands production requires large amounts of energy, the upstream GHG emissions from this sector are significantly higher than for conventional oil and gas. Massive development of a relatively GHG-intensive fossil fuel resource creates an obvious problem for Canada, given its commitment under the Kyoto Protocol[1] to reduce net GHG emissions.

This paper examines legal and policy issues associated the use of biotic carbon sequestration as one component of Canada's response to this problem. Sinks-based offsets are not a complete answer to anthropogenic climate change, but they could play a role in reconciling oil sands development with constraints on net GHG emissions. While Canada has actively promoted this option in international climate change negotiations, the mechanisms for implementing a sinks-based offset regime have yet to be developed at either the national or the provincial levels. This legal and policy vacuum should be filled if biotic carbon sequestration is to achieve its potential as part of Canada's GHG management strategy.

The paper begins by reviewing briefly the GHG implications of oil sands development, the responses to date to this issue in Canada, and the basic rationale for using biotic carbon sinks to offset fossil carbon emissions. The discussion then turns to eight important issues that should be addressed within a legal and policy framework for biotic carbon sequestration. Finally, the paper identifies four key components of an overall framework for sinks-based offsets.

2. Oil Sands Development and GHG Emissions

Oil sands in Alberta are the third largest oil resource basin in the world, behind the Persian Gulf and Venezuela.[2] Recoverable oil reserves are estimated at 49 billion cubic meters – approximately the same quantity as Saudi Arabia's proven conventional oil reserves.[3] New

[1]Kyoto Protocol to the United Nations Framework Convention on Climate Change, 10 December 1997, UNFCCC COP, 3d Sess., UN Doc. FCCC/CP/1997/L.7/Add.1, 37 I.L.M. 22.

[2]Report of Upstream Oil and Gas Working Group of the Industry Issues Table to the National Climate Change Secretariat, *Upstream Oil and Gas Industry Options Paper* (September 1999) at 1 (available at www.nccp.ca/html/tables/pdf/options/Upstream_Oil_and_Gas_new_en.pdf).

[3]National Energy Board (NEB), *Canada's Oil Sands: A Supply and Market Outlook to 2015* (Calgary: NEB, October 2000) at 1.

investment in the oil sands is significant by any standard, with $3 billion to $5 billion invested per year since 1996 and over $40 billion worth of projects announced for decade ending in 2010.[4] While volatile commodity prices and other factors make it likely that some planned projects will not proceed,[5] large-scale development of the oil sands seems inevitable. Production from oil sands mining in 1999 averaged over 51,000 m^3/day, approximately 15% of Canada's crude oil output.[6] The National Energy Board estimates that production levels will increase three-fold to 158,000 m^3/day by 2015.[7] Similarly, bitumen production is expected to increase by two and one-half times, from 1999 levels of 42,000 m^3/day to 103,000 m^3/day by 2015.[8] These increases, combined with declining reserves in the conventional oil fields of western Canada, suggest that over 50% of Canada's crude oil production may be from oils sands by 2015.[9]

While oil sands development will generate significant economic benefits for Alberta and for Canada as a whole, the environmental impacts and risks are also considerable. In addition to its effects on forests, aquatic ecosystems and regional air quality,[10] this development will have a major impact on Canada's GHG emissions profile.

a. Oil Sands and Canada's Emissions Profile

Extracting synthetic crude oil from oil sands and bitumen requires large amounts of energy. As a result, it also generates GHGs.[11] A life-cycle analysis of GHG emissions from selected Canadian and foreign oil reserves was included in the *Oil and Natural Gas Industry Foundation Paper*,[12] released in 1998 as part of the National Climate Change Process. This analysis highlights the distinctive emissions pattern associated with oil sands production. While conventional Canadian light crude and synthetic crude from oil sands have roughly equivalent GHG emissions per unit associated with transportation, refining, transportation fuel combustion

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[4]Canadian Association of Petroleum Producers (CAPP), *Oil and Natural Gas Strategies for North American Energy Markets* (Calgary: CAPP, April 2001) at 9.

[5]NEB, *supra* note 3 at 2.

[6]*Ibid*. at 43.

[7]*Ibid*. at 43. The NEB's price sensitivity modeling generates a range of predicted production levels from 112,000 to 180,000 m^3/day.

[8]*Ibid*. at 43-44.

[9]*Ibid*. at 58.

[10]*Ibid*. at 82-91. See also, G. MacCrimmon & T. Marr-Laing, *Patchwork Policy, Fragmented Forests: In-situ oil sands, industrial development, and the ecological integrity of Alberta's boreal forest* (Drayton Valley, AB: Pembina Institute for Appropriate Development, May 2000).

[11]Most of the GHG emissions result from steam production to separate bitumen from sand. See NEB, *ibid*. at 86.

[12]*Oil and Natural Gas Industry Foundation Paper: Background Information on the Ability of the Industry to Contribute to Greenhouse Gas Emission Reductions*, Prepared for the National Climate Change Secretariat (September 1998) at 61 (available at www.nccp.ca/NCCP/pdf/indus_oil.PDF).

and byproduct equivalent, there is a striking difference at the production stage. Producing a cubic metre of synthetic crude generates more than three times as much GHGs (measured in CO_2 equivalent) as does production of the same amount of conventional oil.[13]

Significant upstream emissions combined with the expected large increases in production have made oil sands development a major factor in the projected divergence between Canada's GHG emissions profile and its allowable level of emissions under the Kyoto Protocol.[14] A comparison of the 'Kyoto gap' and estimated GHG emissions from oil sands production reveals the magnitude of the problem. Canada's commitment under the Kyoto Protocol is to reduce annual GHG emissions in the first 'commitment period' (2008-2012) to 6% below 1990 levels. Meeting this target would require total emissions of 571 megatonnes (MT).[15] Projections released by the federal government in 2002 indicate that, taking account of policy initiatives in place at that time, Canada was facing the prospect of exceeding that amount by approximately 166 MT.[16]

According to the National Energy Board, annual GHG emissions from the oil sands production will be approximately 48.9 MT by 2015.[17] This estimate is similar to the projected 49.3 MT of GHG emissions from oil sands in 2015 that is reported by the Analysis and Modelling Group of National Climate Change Process (NCCP) in *Canada's Emissions Outlook: An Update*.[18] The NCCP's estimate of GHG emissions from oil sands production for 2010, the middle of the first 'commitment period', is 37.5 MT. GHG emissions associated with the production of crude oil from oil sands may therefore account for approximately 25% of Canada's 'Kyoto gap'.

Massive oil sands development clearly signals Canada's long-term commitment to the production of fossil fuel for domestic consumption and export. Furthermore, increasing reliance on synthetic crude from oil sands is a relatively high emissions energy option when compared with the conventional oil that it is replacing, let alone alternatives such as natural gas or

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[13] *Ibid*. at 61.The exact numbers for production emissions are 0.211 tonnes of CO_2 equivalent (CO_2E) per cubic metre of transport fuel used in central North America for Canadian Light crude, 0.779 CO_2E for synthetic oil produced in 1995, and an estimate of 0.659 CO_2E for synthetic oil in 2005.

[14] See, for example: Government of Alberta (Alberta Environment), *Albertans & Climate Change: An Assessment of the Economic Impacts of the Kyoto Protocol* (February 2002) at 12, 14 (available at www3.gov.ab.ca/env/climate/actionplan/docs/assessment.pdf); Dermot Foley, *Fuelling the Climate Crisis: The Continental Energy Plan* (Vancouver: David Suzuki Foundation, May 2001) at 14-16 (available at www.davidsuzuki.org/Publications/Climate_Change_Reports/default.asp#Fuelling).

[15] Government of Canada, *A Discussion Paper on Canada's Contribution to Addressing Climate Change* (May 2002) at 15 (available at www.climatechange.gc.ca).

[16] *Ibid*. at 15.

[17] NEB, *supra* note 3 at 88.

[18] *Ibid*, at 88. See, National Climate Change Process, Analysis and Modelling Group, *Canada's Emissions Outlook: An Update* (December 1999) Annex C, Upstream Oil and Gas Industry – GHG emissions (Megatonnes CO_2 – Equivalent) C-27 (available at www.nrcan.gc.ca/es/ceo/outlookc.pdf).

renewable energy. The decision to follow this energy path reflects both an acceptance of market forces and the adoption of specific policy measures. Oil sands are publicly owned resources that have been promoted by governments and leased to private companies. Furthermore, as documented by the federal Commissioner of the Environment and Sustainable Development, the tax and royalty regime for oil sands is significantly more generous than for conventional oil and gas.[19]

An evaluation of the decision by the federal and Alberta governments to promote oil sands development aggressively as part of their energy strategies beyond the scope of this paper. The focus here is on the implications of this policy choice for Canada's ability to reduce net GHG emissions. The next step in this analysis is to review briefly the response thus far to the tension between oil sands mega-projects and impending constraints on GHG emissions.

b. Public Policy, Regulation and Voluntary Initiatives

The governments of Canada and Alberta have responded in various ways to climate change issues, but there are few direct linkages between GHG policy and oil sands development. As noted above, the active promotion of oil sands and the establishment of a preferential tax and royalty regime indicate that concerns relating to climate change have not led governments to reconsider their general support for this energy option. GHG emissions from oil sands and other sources are not regulated under environmental protection statutes or regulations at either the federal or provincial levels. Furthermore, specific measures to address GHG emissions from oil sands have not been included in regulatory approvals.

Climate change has been raised at hearings of the Alberta Energy and Utilities Board (EUB) on applications for oil sands projects. Environment Canada has expressed concern that the cumulative GHG emissions from oil sands development will adversely affect Canada's ability to meet its commitments under the Kyoto Protocol.[20] It recommended that oil sands operators continue to investigate and adopt best available technologies for reducing GHG emissions. Other interveners have also argued that oil sands operators should take measures to address GHG emissions.[21]

In response to these concerns, the EUB has acknowledged companies' efforts to improve energy efficiency, reduce GHG emissions per unit of production, voluntarily set emissions targets, and report on progress in achieving them.[22] It has not, however, incorporated any

[19]Government of Canada, *Report of the Commissioner of the Environment and Sustainable Development to the House of Commons – 2000* (Ottawa: Minister of Public Works and Government Services, 2000) Chapter 3, Government Support for Energy Investments, at 3-20. See also, M. Bramley & L.-A. Robertson, *Provincial Government Performance on Climate Change: 2001* (Drayton Valley, AB: Pembina Institute for Appropriate Development, September 2001) at 16-17 (available at www.pembina.org).

[20]For example, EUB Application No. 970588 Shell Canada Limited Muskeg River Oil Sands Mine Project, *Submission of the Department of the Environment (Environment Canada)*, (November 3, 1999) Chapter 2: Cumulative Effects, at 3 (available at www.pnr-rpn.ec.gc.ca/community/muskeg/bb00s02.en.html).

[21]See, for example, EUB, Syncrude Canada Ltd. Mildred Lake Upgrader Expansion, Decision 99-25 (October 14, 1999) at 12-13.

[22]See, for example: EUB, *ibid*. at 13; EUB, Suncor Energy Inc. Proposed Project Millennium Development,

voluntary undertakings by oil sands operators into project approvals, nor has it imposed conditions of its own. The EUB's position is that "the issue of GHGs is best dealt with through initiatives and policies developed at the federal and provincial levels" and that "The Board will not unilaterally impose conditions on oil sands operators in the absence of these policies and initiatives."[23] The result is that oil sands projects having significant long-term implications for Canada's GHG emissions are being approved without any systematic consideration of these emissions at the project review and regulatory stages.[24]

There have, of course, been general policy initiatives in anticipation of eventual limits on GHG emissions. A key component of the federal government's climate change policy has been the Voluntary Challenge and Registry (VCR) Program,[25] which records voluntary actions that have produced GHG benefits. The major oil sands operators are participants in the VCR Program and have reported impressive gains in energy efficiency and corresponding reductions in the carbon intensity of production. For example, Suncor notes that its GHG emissions per unit of production in 1999 were 30% below 1990 levels, with a further reduction to 42% below these levels expected when the Project Millennium expansion is operational.[26] Syncrude has stated that it expects new technologies to yield a 38% decrease in CO_2 emissions per unit of production between 1990 and 2008.[27] Oil sands producers as a group have projected that CO_2 emissions per unit of output will have declined to 45% below 1990 levels by 2010.[28] Nonetheless, declining GHG intensity of production is insufficient to bring oil sands operations in line with Kyoto commitments. Planned expansion of oil sands operations will significantly increase total GHG emissions, regardless of reductions achieved per unit of output.[29]

Other measures that oil sands operators have taken to address GHG emissions include the capture of vented methane, reductions in the flaring of solution gas, the purchase of domestic and international offsets, environmental and economic research, education and training programs relating to GHG emissions, the development of alternative and renewable sources of energy, and

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Addendum B to Decision 99-7 (July 23, 1999) at 20; EUB, Shell Canada Limited Muskeg River Mine Project, Decision 99-2 (February 12, 1999) at 24.

[23]EUB, *ibid*. (Syncrude Canada Ltd. Mildred Lake Upgrader Expansion, Decision 99-25) at 13.

[24]Pembina Institute for Appropriate Development. *Alberta Solutions: Practical and Effective Alberta Actions to Address Climate Change* (Drayton Valley, AB: Pembina Institute for Appropriate Development, April 1999) at 11 (available at www.pembina.org).

[25]See: www.vcr-mvr.ca.

[26]Suncor Energy, *Global Climate Change: Managing Suncor's own emissions* (September 2000) at 1 (available at www.suncor.ca).

[27]Syncrude Canada Ltd., *Energy Efficiency and CO_2* (available at www.syncrude.com/enviro/energy.html).

[28]Athabasca Oil Sands Developers Association, *Progress in Canada's Oil Sands* (June 2000) at 13 (available at www.vcr-mvr.ca/ClientDetail.cfm?No-3030).

[29]EUB, *supra* note 22 (Suncor Energy Inc. Proposed Project Millennium Development, Addendum B to Decision 99-7) at 20.

participation in the work of industry associations, government initiatives and multi-stakeholder processes relating climate change.[30] Public and private sector initiatives to date signal an awareness of the GHG implications of oil sands development. They do not, however, constitute a comprehensive strategy to reconcile large-scale oil sands development with Canada's allowable GHG emissions under the Kyoto Protocol or with limits on GHG emissions that may be established through other international agreements. Since government policy statements and massive private sector investment indicate that production from oil sands will continue to expand in the coming decades, three broad options can be considered when developing such a strategy.

c. Options to Address Oil Sands Emissions

The first option is to 'make room' for emissions from oil sands by requiring significant reductions in the GHGs released from other sources. The costs of oil sands emissions would then be borne by other emitters and their customers,[31] or by governments (i.e., taxpayers) through the payment of subsidies to achieve the emissions reductions required to meet national commitments. The rationale for this option would presumably be that oil sands development is a high value source of GHG emissions and that the public interest is served by ensuring that this development proceeds without undue costs or regulatory constraints. In effect, it treats oil sands emissions as an independent variable to be accommodated through a broader climate change strategy. The result is to externalize the costs of oil sands production to others.

A second option is to rely on technological breakthroughs to reduce oil sands emissions without cutting production. For example, it is possible in some circumstances to capture GHGs from industrial sources and inject them into underground geological formations for long-term storage.[32] While the geological sequestration of GHGs in Canada is the subject of ongoing research[33] and a pilot project,[34] its potential to reverse the upward trend in GHG emissions from oil sands operations has yet to be proven.

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[30]NEB, *supra* note 3 at 87. These initiatives are described on company web sites and in their action plans and periodic reports submitted under the VCR Program.

[31]Costs associated with emissions reductions could be passed on to customers unless competitive pressures make it impossible to raise prices and maintain market share.

[32]J. Davison *et al*., *Putting Carbon Back Into The Ground* (Stoke Orchard, Cheltenham, Gloucestershire, U.K.: International Energy Agency (IEA) Greenhouse Gas R&D Programme, 2001) (available at www.ieagreen.org.uk).

[33]Suncor is participating with a consortium of global energy companies in the CO_2 Capture Project, aimed at developing CO2 separation and geologic storage technologies. See, Suncor Inc., "Seven Global Energy Companies Announce Joint Project" (available at www.suncor.com/bins/content_page.asp?cid=4-18-484). The EUB has also signed a five-year agreement with Princeton University to study geological sequestration. See, EUB, *Across the Board* (January 2002) at 3 (available at www.eub.gov.ab.ca).

[34]See: "Backgrounder – IEA Carbon Dioxide Monitoring Program (Weyburn) (available at www.nrcan.gc.ca/css/imb/hqlib/200061ea.htm); Petroleum Technology Research Centre, "The Weyburn CO_2 Project" (available at www.ptrc.ca/projects/weyburn.htm).

A third option is for oil sands operators to offset their GHG emissions by purchasing emissions credits. These credits could be created through reductions in emissions from other sources[35] or by establishing and enhancing carbon sinks. Offset strategies could be used to internalize within the oil sands industry its full costs in terms of GHG emissions. Emissions credits and offsets could be purchased in Canada and internationally, since the release or sequestration of a tonne of carbon has the same effect on atmospheric concentrations of GHGs regardless of where the source or sink is located.

The use of carbon sinks to offset GHG emissions from other sources is clearly sanctioned by the Kyoto Protocol. Article 3.3 requires Annex I countries (i.e., developed countries and countries in transition to market economies) to take account of carbon sources and sinks that are directly attributable to human-induced afforestration, reforestation and deforestation since 1990 when calculating their net GHG emissions during the first 'commitment period'[36] Under article 3.4, carbon sinks and sources associated with additional categories of 'land use, land-use change and forestry' (LULUCF) can be identified as eligible for inclusion in calculations of net GHG emissions. The importance of transparency and verifiability in the calculation of biotic carbon fluxes is referred to in both articles 3.3 and 3.4. Key definitions and principles to guide implementation of these provisions were formally adopted at the seventh conference of the parties (COP 7), held in 2001 at Marrakesh.[37]

These three options for addressing GHG emissions from oil sands development are not, of course, mutually exclusive. Canada's approach to GHG management will consist of multiple initiatives rather than a single 'magic bullet'.[38] This paper focuses on the use of domestic carbon sinks as offsets because:

- Sinks have been endorsed by signatories to the *Framework Convention on Climate Change*[39] and the Kyoto Protocol as a means of offsetting GHG emissions when calculating countries' net emissions;

- Carbon sequestration will likely remain on the table in international climate change negotiations directed to reaching subsequent (or alternative) multilateral agreements;[40]

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[35]For a thorough discussion of emissions trading, see: C. Rolfe, *Turning Down the Heat: Emissions Trading and Canadian Implementation of the Kyoto Protocol* (Vancouver: West Coast Environmental Law Research Foundation, 1998).

[36]The first commitment period under the Kyoto Protocol is 2008-2012.

[37]United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001, addendum, Part Two: Action Taken by the Conference of the Parties, Volume 1, FCCP/CP/2001/13/Add.1 (21 January 2001) at 54-63. (Decision 11/CP.1, "Land use, land-use change and forestry") (hereinafter "Marrakesh Accords") (available at unfccc.int/resource/docs/cop7/13a01.pdf).

[38]Government of Canada, *supra* note 15.

[39]*United Nations Framework Convention on Climate Change* (1992) 31 I.L.M. 849.

[40]B. Schlamadinger & G. Marland, *Land Use & Global Climate Change: Forests, Land Management, and*

- Canada's active support for carbon sinks in international climate change negotiations suggests that this mechanism will have a role in reducing net GHG emissions in this country;[41]

- Canada's forests and agricultural land have the potential to sequester a significant amount of atmospheric carbon;[42] and

- The federal and Alberta governments have recognized the value of promoting, where possible, the development of GHG mitigation strategies in Canada, thereby capturing any collateral environmental or other benefits associated with these projects, developing domestic expertise, reducing the need to invest capital abroad, and avoiding risks and uncertainties that may be associated with reliance on offset programs in other countries.[43]

Estimates presented in federal government's *Climate Change Plan for Canada*, released in November 2002, suggest that emissions offsets from the forestry and agricultural sectors should reach 30 MT under existing practices.[44] According to the federal plan, policy options are being considered that could add significantly to this level of biotic carbon sequestration.[45] Sinks-based emission offsets are therefore capable of making a substantial contribution to addressing GHG emissions from oil sands which, as noted earlier, are expected to be in the range of 37-49 MT at the time of the first commitment period under the Kyoto Protocol.[46]

There remain, however, numerous issues that must be addressed at international and domestic levels before sinks-based emissions offsets can play a significant role in Canada's national strategy for reducing net GHG emissions. Scientific and technical issues have received the most attention,[47] although there has been some discussion of the legal, institutional and

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the Kyoto Protocol, Prepared for the Pew Center on Global Climate Change (June 2000) at 48-49 (available at www.pewclimate.org).

[41]Government of Canada, *supra* note 15 at 5.

[42]Quantitative estimates of this potential vary widely at the present time, reflecting scientific and methodological limitations and uncertainty regarding the eligibility criteria for sinks-based emissions offsets. See: National Climate Change Process (NCCP), *Sinks Table Options Paper: Land-Use, Land-Use Change and Forestry in Canada and the Kyoto Protocol* (September 23, 1999) at 16 (available at www.nccp.ca/html/tables/pdf/options/Sinks_OR-Sep-23-1999_en.pdf); D. Anderson, R. Grant & C. Rolfe, *Taking Credit: Canada and the Role of Sinks in International Climate Negotiations*, (Vancouver: David Suzuki Foundation & West Coast Environmental Law, 2002) at 49 (available at www.davidsuzuki.org/Publications/Climate_Change_Reports/default.asp#Taking).

[43]Government of Canada, *supra* note 15 at 19; Government of Alberta, *Albertans & Climate Change: A Plan for Action* (2002) at 2 (available at www3.gov.ab.ca/env/climate/actionplan/docs/actionplan.pdf).

[44]Government of Canada, *Climate Change Plan for Canada* (November 2002) (available at www.climatechange.gc.ca) at 39 (hereinafter "federal plan").

[45]*Ibid*. at 39.

[46]*Supra* note 5 at 17-18.

[47]These issues are reviewed in detail in: Intergovernmental Panel on Climate Change (IPCC), *Land Use,*

policy dimensions of biotic carbon management.[48] Some of these issues are also referred to in the climate change plans released by the Governments of Canada[49] and Alberta[50] in the fall of 2002. The discussion that follows provides a basis for assessing the current state of federal and Alberta policy in this area and suggesting next steps in establishing a legal and policy framework for biotic carbon sequestration.

3. Issues and Policy Directions for Biotic Carbon Sequestration

The development of a "framework" for biotic carbon sequestration as a source of credits for GHG emissions trading is one component of the climate change strategies described in the federal and Alberta plans. The federal plan "proposes to establish a framework that will enable agricultural and forestry sinks and emissions reductions to be sold as offsets into a domestic emissions trading system."[51] Alberta's plan refers to a "biosinks framework aimed at enhancing carbon capture and storage activities in the agricultural and forest sectors"[52] and to "a provincial GHG emission trading framework that links carbon enhancements to soil and forest sinks to the trading of emission reduction offsets."[53] The references to frameworks for biotic carbon sequestration in both plans are cross-referenced to sections on emissions trading.

It is clear from both plans that emission trading is assumed to be a principal driver for biotic carbon sequestration. Once limits on GHG emissions are established and tradable permits are issued, the market for sinks-based offsets is expected to provide financial incentives for private sector investment in 'land use, land-use change and forestry' (LULUCF) projects. In practice, a mix of market and non-market mechanisms will likely be necessary to achieve large-scale sequestration of biotic carbon.[54] A legal and policy framework for sinks-based offsets therefore has two complementary objectives.

Land-Use Change, and Forestry (Cambridge, U.K.: Cambridge University Press, 2000) (hereinafter "IPCC Report").

[48]For a summary of these issues, see: S.A. Kennett, "National Policies for Biosphere Greenhouse Gas Management: Issues and Opportunities" (2002) 30 *Environmental Management* 595.

[49]*Supra* note 44.

[50]Government of Alberta, *Albertans & Climate Change: Taking Action* (October 2002) (available at www.gov.ab.ca/env) (hereinafter "Alberta plan").

[51]Federal plan, *supra* note 44 at 40.

[52]Alberta plan, *supra* note 50 at 36.

[53]*Ibid*. at 37.

[54]K. Richards, "Coercion and enterprise in the provision of environmental public goods: the case of carbon sequestration in the United States" (1997) 27 (Special) *Critical Reviews in Environmental Science and Technology* S293.

The first objective is to provide the market-support mechanisms that are necessary to facilitate private sector investment in LULUCF projects and the efficient trading of sinks-based emissions offsets. These mechanisms are generally designed to increase certainty for market participants and reduce the transaction costs associated with investment and trade in sinks-based emissions credits. The role of government in this respect is analogous in many ways to that played by the legal, regulatory and policy framework that applies to the market for financial securities.

The second objective is to address a range of market failures and structural obstacles that may result in a sub-optimal level of biotic carbon sequestration from a societal perspective. Examples of market failure include the discounting or ignoring of public goods and negative externalities associated with LULUCF projects. Government can correct these failures through direct regulation, financial incentives, or the provision of public goods. Legal and policy measures to align the overall regime for land and resource management with objectives of biotic carbon sequestration may also be required in order to remove obstacles to LULUCF projects.

The overarching objectives of supporting market mechanisms and promoting biotic carbon sequestration through non-market initiatives can be linked to a series of more specific issues. The following sections examine eight of these issues and note the extent to which each of them is addressed in the federal and Alberta climate change plans.

a. The Legal Foundation

A clear legal basis for property rights and contractual arrangements is an important precondition for private investment in LULUCF projects and for an efficient market for sinks-based emissions offsets.[55] Investors and market participants will require secure and transferable legal rights in sequestration potential, terrestrial carbon pools, and sinks-based emissions offsets. Contractual rights, remedies and enforcement procedures relating to carbon sinks and emissions credits should also be addressed.

The Canadian constitution gives provincial governments primary legislative jurisdiction over land and resource use, property rights, and contract law.[56] It is not surprising, therefore, that ownership rights in sinks and sequestered carbon are addressed in Alberta's climate change plan and in a bill entitled the *Climate Change and Emissions Management Act*[57] that was tabled in the provincial legislature in November 2002.

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[55]K.L. Rosenbaum, "Climate Change and the Forestry Sector: Possible Legislative Responses for National and Subnational Governments", United Nations Food and Agriculture Organization (FAO), FAO Legal Papers Online #14 (March 2001) (available at: www.fao.org/legal/prs-ol/paper-e.htm).

[56]For analysis of constitutional issues relating to climate change and GHG emissions, see: Rolfe, *supra* note 35 at 347-367; E.M. Shier, *Climate Change and the Constitution*, A Thesis Submitted to the Faculty of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of Master of Laws, Faculty of Law, University of Calgary (June 1994).

[57]Bill 32, *Climate Change and Emissions Management Act*, 2nd Sess., 25th Leg., Alberta, 2002 (available at www.assembly.ab.ca) (hereinafter "Bill 32").

Alberta's plan affirms that "A clear government statement on the ownership of emission reductions from agriculture and forest sinks will be the initial step for facilitating private sector activities to enhance these carbon sinks."[58] Provincial policy on ownership has three key elements:[59]

- Title to sinks on Alberta Crown land is vested in the Alberta government;
- Title to sinks on all other land is vested in the owner of that land, and the ownership of incremental carbon offsets created through LULUCF activities is a private matter; and
- Sinks will be considered personal property for the purpose of emission trading.

These broad statements are a starting point in establishing the legal foundation for sinks-based offsets, but there is obviously much detail that could be provided.[60]

Alberta's plan also refers briefly to other legal matters. The government states its intention to examine the appropriate mechanism for dealing with liability issues,[61] a topic returned to below in connection with the risk of premature release of terrestrial carbon stores. The plan also refers to the development of "standard contracts for facilitating trades and minimizing risks between buyer and seller".[62] It thus acknowledges the important role that a legal and policy framework could play in reducing transaction costs for investors in LULUCF projects and participants in the market for sinks-based offsets.

Bill 32, the *Climate Change and Emissions Management Act*, is framework legislation that leaves many of the important details to be filled in by regulations and policy. It also reflects the provincial government's broader strategic objectives, notably an attempt to bolster Alberta's political and constitutional arguments in the context of its disagreement with the federal government over climate change policy as a whole and the Kyoto protocol in particular.[63]

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[58]Alberta plan, *supra* note 50 at 35.

[59]*Ibid*. at 36.

[60]See Rosenbaum, *supra* note 55.

[61]Alberta plan, *supra* note 50 at 35, 37.

[62]*Ibid*. at 37.

[63]See, for example, the arguments outlined in the Preamble to Bill 32, *supra* note 57.The Preamble refers to Alberta's constitutional jurisdiction regarding renewable and non-renewable resources and then states that "carbon dioxide and methane are natural resources, are not toxic under atmospheric conditions and are inextricably linked with the management of other renewable and non-renewable natural resources." For a critique of the Alberta government's constitutional arguments and other elements of Bill 32, see: Environmental Law Centre, *In Response to Bill 32: The Climate Change and Emissions Management Act* (February 2003) (available at www.elc.ab.ca).

The bill has several provisions that are directly relevant to the legal basis for biotic carbon sequestration as a climate change strategy. It defines biotic sinks[64] and authorizes agreements between the government and sectoral representatives respecting sinks, emission offsets and emission trading.[65] Regulations may be enacted to establish a system of emissions trading, including a public registry.[66] More specifically, the bill translates the government's policy statement on property rights in sinks into statutory language.[67] It also includes sweeping authority to make regulations on a range of specific topics and "generally in the furtherance of addressing climate change management".[68] While this legislation provides some answers to basic legal questions relating to biotic carbon sequestration, it is far from a comprehensive legal framework for LULUCF projects and sinks-based emissions offsets. Four areas in particular would benefit from greater attention.

First, the blanket assertion of government ownership of sequestration rights on public land raises questions about the role of private parties whose activities have potentially significant implications for carbon sinks and stores. While the rights, liabilities and benefits associated with private sector investment in LULUCF projects on public land could be addressed through contractual mechanisms – as will presumably be the case on private land – legislative or policy guidance regarding these issues would be useful.[69] For example, forestry companies operating on public land are already governed by the terms of their forest tenures and by a range of regulatory requirements. The relationship between the existing resource tenures, the forest management regime, and the legal and policy framework for biotic carbon sequestration may require clarification.

Second, carbon rights legislation could establish specific legal mechanisms to facilitate the creation and trading of interests in sequestration potential and sinks-based offsets. For example, the property law concept of easements that 'run with the land' could be used to give holders of sequestration rights a legal foundation that goes beyond a contractual arrangement with current landowners.[70] Sequestration easements could provide investors in LULUCF projects with a secure property right that could be enforced against future land owners and used to secure legal protection against land uses that adversely affect biotic sinks and terrestrial carbon stores.

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[64] *Ibid.*, s. 1(f)(i).

[65] *Ibid.*, s. 4(1)(l).

[66] *Ibid.*, s. 5(c).

[67] *Ibid.*, ss. 8(1), (3).

[68] *Ibid.*, s. 17(1).

[69] Paul Griss, *Forest Carbon Management in Canada: Final Report of the Pollution Probe Forest Carbon Management Workshop Series* (July 2002) at 35-36 (available at www.pollutionprobe.org/whatwedo/Kyoto.htm).

[70] Rosenbaum, *supra* note 55 at 20.

A public title registry could also be established to reduce uncertainty and transaction costs for purchasers of sequestration rights.[71]

The Australian state of New South Wales has addressed the security and transferability of carbon rights by enacting legislation that explicitly establishes property rights in carbon and grants the holders of these rights a guarantee of access to the land in question and the ability to obtain injunctions to block land uses that may adversely affect sinks and terrestrial carbon stores.[72] This legislation provides a model that goes beyond a simple statement of ownership to establish a more sophisticated legal framework for biotic carbon sequestration.

Third, carbon rights legislation could address enforcement and remedies. For example, guidance on damages in the event of project failure could be provided. Since many LULUCF projects will generate public benefits (e.g., public goods) in addition to tradable emissions offsets, special damage awards could be prescribed in order to ensure that both public and private interests are protected in the event of a loss of sequestered carbon.[73] Private contractual mechanisms could also be given a regulatory backstop.[74]

Finally, the standardization of contractual mechanisms that is referred to in the Alberta plan could be promoted through provisions in carbon rights legislation that establish both substantive and procedural guidance for investors in LULUCF projects and participants in markets for sinks-based offsets. While government may not want to limit unduly the flexibility of private contractual arrangements, transaction costs could be reduced if some of the basic parameters for these relationships are defined in legislation or policy.

The development of carbon rights legislation on a province-by-province basis could be supplemented by a multilateral initiative. While carbon sequestration legislation may vary to reflect the particular circumstances and priorities of each jurisdiction, there are nonetheless a significant number of common issues to be addressed. Furthermore, promotion of carbon sequestration at the provincial level should be coordinated with federal climate change initiatives and with the emerging international regime. Emissions offsets generated under provincial legislation should be recognized and readily tradable in national and international markets in order to achieve maximum economic and environmental benefits. These factors, combined with the advantages of pooling expertise in this area, suggest that the preparation of model carbon sequestration legislation would be a useful intergovernmental project.

Federal framework legislation might also play a role in relation to certain aspects of biotic carbon sequestration and the trading of emissions credits, reflecting the fact that the subject of climate change can plausibly be characterized as a matter of national concern.[75] The

[71] *Ibid*. at 26.

[72] *Ibid*. at 17. Information on the *Carbon Rights Legislation Amendment Act 1998* is available at www.forest.nsw.gov.au/carbon/legislation/default.asp.

[73] *Ibid*. at 29.

[74] *Ibid*. at 22.

[75] Rolfe, *supra* note 35 at 351-356; Shier, *supra* note 56 at 253-258.

federal government has a clear interest in ensuring that domestic sequestration projects and carbon accounting rules comply with standards agreed to at the international level. Moreover, the federal government must assume ultimate responsibility for achieving net GHG emissions for the country as a whole that satisfy Canada's obligations under the Kyoto Protocol. The federal climate change plan does not, however, refer to the enactment of legislation addressing biotic carbon sequestration.

b. Risks of Project Failure and Leakage

Investors in LULUCF projects and purchasers of sinks-based emissions offsets will require some certainty that the sequestration required to generate credits will in fact occur. More broadly, the overall integrity of an offset regime and the effectiveness of biotic carbon sequestration as a climate change strategy depend on the ability of carbon sinks to make a real and lasting contribution to stabilizing atmospheric concentrations of GHGs.[76] For these reasons, the risk that LULUCF projects will fail to achieve their sequestration objectives requires attention. Two principal risks can be identified.

The first type of risk is that carbon sequestered through LULUCF projects will be released prematurely to the atmosphere as a result of natural or anthropogenic or events.[77] For example, forest fires can rapidly transform terrestrial carbon pools accumulated over decades or centuries into atmospheric carbon. Similarly, the increased carbon stores in agricultural soil that can be achieved through conservation or no-till farming can be rapidly lost with a return to conventional agricultural practices. The objective of stabilizing atmospheric concentrations of GHGs that are central to the *Framework Convention on Climate Change* and the Kyoto Protocol would clearly be undermined if countries can use the transitory sequestration of carbon in the terrestrial biosphere to offset the permanent injection of fossil carbon to the global carbon cycle.

The second type of project risk is leakage, which occurs when actions to increase terrestrial carbon stores in one area result in increased emissions elsewhere.[78] For example, the establishment of protected areas or special management regimes to increase forest carbon pools may displace logging rather than reducing it and may simply redirect pressures to convert forested land to other uses. Leakage can also occur as sequestration projects affect the supply and price of commodities (e.g., timber), land values, investment opportunities, and other variables that determine land and resource use.[79] The allocation of emissions credits for LULUCF projects should account for any reductions in net benefits for atmospheric GHG concentrations that result from leakage.

Alberta's climate change plan acknowledges the importance of project risk, noting that biotic carbon sequestration can be rapidly reversed and that "the core concern associated with the

[76]IPCC Report, *supra* note 47 at 85.

[77]*Ibid*. at 315-316.

[78]*Ibid*. at 308.

[79]*Ibid*. at 83.

impermanent nature of carbon sinks is determining who bears the ultimate liability for released carbon."[80] It contains a general undertaking to examine liability mechanisms and suggests that these mechanisms could be linked to the development of standard contracts to facilitate trades and reduce risks.[81] However, Alberta's plan does not outline an overall legal and policy strategy to manage project risk and to address leakage. The federal climate change plan makes no reference to project risk or leakage.

Participants in the market for sinks-based offsets can be expected to develop private contractual mechanisms for reducing and allocating project risk. There is, however, a potentially significant role for government in developing standards and procedures to reduce transaction costs associated with risk allocation and management. Official endorsement of carbon accounting techniques – such as discounting and the use of tonne-year formula for calculating credits – is one option for addressing the risks of project failure. Regulatory requirements or certification standards for the design and implementation of LULUCF projects could facilitate the management of project risk, thereby reducing uncertainty for investors and purchasers. For example, LULUCF projects could be required to build in surplus credits or engage in cooperative risk sharing.[82] Government could also implement, facilitate, or regulate a variety of risk mitigation mechanisms, such as the pooling and diversification of LULUCF projects and the use of insurance to cover losses due to unexpected project failure.

Many of these techniques are equally applicable to the problem of leakage from LULUCF projects. Carbon accounting mechanisms, improvements to project design, and risk mitigation measures such as project pooling and diversification could all be used. Direct regulation of land and resource use may also reduce some types of leakage. Since leakage may reflect overall patterns of land and resource use, addressing this issue may involve altering the underlying determinants of these patterns through a range of regulatory, resource management and fiscal instruments.[83] Placing LULUCF projects in a landscape context may be necessary in order to address the root causes of leakage.[84]

There is an extensive literature on project risk and leakage, along with some practical experience in the design and implementation of risk management mechanisms as part of national policies to promote biotic carbon sequestration.[85] These sources could provide useful guidance when designing a legal and policy framework to address this issue in Canada.

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[80]Alberta plan, *supra* note 50 at 35.

[81]*Ibid*. at 37.

[82]IPCC Report, *supra* note 47 at 316.

[83]*Ibid*. at 84, 310.

[84]Griss, *supra* note 69 at 40.

[85]IPCC Report, *supra* note 47 at 308-314; L. Aukland, P. Moura Costa & S. Brown, "A conceptual framework for addressing leakage on avoided deforestation projects" (available at www.ecosecurities.com).

c. Monitoring and Verification

Regardless of the measures taken to reduce risk directly or to mitigate the consequences of project failure and leakage, the monitoring of LULUCF projects and the verification of total sequestration will be essential for the integrity of sinks-based emissions credits. Articles 3.3 and 3.4 of the Kyoto Protocol require transparent and verifiable reporting of GHG removals by sinks and emissions from sources. National monitoring systems are required by article 5. For individual LULUCF projects, effective monitoring and verification are necessary to determine the appropriate allocation of emissions credits.

Monitoring and verification raise difficult scientific and technical issues, but there is an important legal and policy dimension as well. Canada's ability to use biotic carbon sequestration to offset GHG emissions under the Kyoto Protocol will depend on the credibility of its monitoring and verification procedures. Government involvement in this area through the setting of standards and the direct provision of monitoring and verification services could enhance confidence in the market for sinks-based emissions offsets, reduce transaction costs for market participants, and capitalize on economies of scale and expertise that are available in the public sector.

The federal plan recognizes the importance of monitoring and verification, stating that investments are now being made in the "measurement and verification technologies that will enable us to comply with the monitoring, reporting and review obligations under the Kyoto Protocol."[86] Particular reference is made to collaboration with provincial and territorial governments on "the database and methodologies necessary for the accurate and timely measurement of our forest and agricultural sinks."[87] The plan contains few details, however, regarding the direct role of government in monitoring and verification, the development of standard protocols for LULUCF projects, or the integration of these protocols into a regulatory or certification regime for sinks-based emission offsets.

Alberta's climate change plan also includes a commitment to work towards establishing "the framework for a measuring, monitoring and verification system."[88] A full cost analysis of GHG reduction practices, including monitoring and verification, is another component of Alberta's plan. Finally, Alberta states that it will continue to work with the BIOCAP Canada Foundation – a university based research network that includes partners from industry and government – to confirm the reliability of carbon sinks and estimate the potential for biotic carbon sequestration.[89]

The legal and policy basis for monitoring and verification could include two other types of initiatives. First, standards could be formalized through protocols or regulatory requirements,

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[86]Federal plan, *supra* note 44 at 53.

[87]*Ibid*. at 53.

[88]Alberta plan, *supra* note 50 at 37.

[89]*Ibid*. at 4

thereby reducing the need to develop monitoring and verification methods on an *ad hoc*, project-by-project basis. Second, government could itself develop and deliver monitoring and verification programs using techniques such as sampling and remote sensing.

d. Market Intermediaries

Private sector investment in LULUCF projects and the marketing of sinks-based emissions offsets may be impeded by transaction costs if biotic carbon sequestration is implemented through a large number of relatively small projects.[90] This scenario is particularly likely for sequestration on private agricultural land or involving small-scale reforestation projects. The use of market intermediaries is one way of reducing transaction costs and enabling market participants to capitalize on economies of scale.[91] These intermediaries could include credit aggregators or brokers, who would promote and identify LULUCF projects, assemble sinks-based credits, and market them to large companies that need to offset their emissions.[92] Credits banks are another mechanism that can connect proponents of LULUCF projects with purchasers of emissions credits.[93]

The role of market intermediaries is not discussed in the federal or Alberta plans. There are, however, two important roles that government could play in this area.[94] First, it could establish regulatory standards and certification procedures for market intermediaries. As in other areas where government oversees banking and brokerage functions, this regulatory oversight would increase investor confidence in the market for sinks-based offsets and reduce transaction costs associated with verifying the competence and financial stability of intermediaries. Second, government could provide project aggregation and credit banking services directly. Both of these government roles could be reflected in the legal and policy framework for biotic carbon sequestration.

e. Environmental Risks

The risk that some LULUCF projects may produce undesirable environmental effects has been identified as a concern with biotic carbon sequestration.[95] For example, replacing natural

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[90]Richards, *supra* note 54 at S306; J. Williams & P. Griss, *Design and Implementation Options for a National Afforestration Program(s)*, Joint Forest Sector Table / Sinks Table Afforestation Study #6: Assessing design and implementation options for a national afforestation program, National Climate Change Process (April 28, 1999) at 24 (available at www.nccp.ca).

[91]Rosenbaum, *supra* note 55 at 26.

[92]Climate Change Central, *A Basis for Greenhouse Gas Trading in Agriculture*, Discussion Paper C3 – 01(a), Final Report of the Emission Reduction Trading Protocol Team (April 30, 2002) at 12-13 (available at www.climatechangecentral.com).

[93]Rosenbaum, *supra* note 55 at 27.

[94]*Ibid*. at 26-27.

[95]Anderson, Grant & Rolfe, *supra* note 42 at 22; German Advisory Council on Global Change (WBGU), *The Accounting of Biological Sinks and Sources Under the Kyoto Protocol: A Step Forwards or Backwards for Global Environmental Protection?* (Bremerhaven: WBGU, 1998) at 37 (available at

forest or grassland ecosystems with monoculture plantations could increase terrestrial carbon pools at the expense of biodiversity and other environmental values. Parties to the *Framework Convention on Climate Change* have responded to these concerns by adopting the principle that the implementation of LULUCF activities should contribute to the conservation of biodiversity and the sustainable use of natural resources.[96] Furthermore, parties are required to describe national legislative arrangements or administrative procedures designed to ensure compliance with this principle.[97]

The federal and Alberta climate change plans do not discuss the potential environmental risks of LULUCF projects or the legal, institutional and policy mechanisms that might be used to address these risks. This issue warrants attention because LULUCF projects with potential environmental risks could be initiated in Canada. The federal plan comments that "Fast growing, high yield forest plantations could increase the rate of carbon storage in the first commitment period, with even greater results as trees mature in subsequent periods."[98] Noting that intergovernmental discussions are planned on this topic, the plan observes that forest plantations could yield economic benefits – notably employment and income diversification – for rural and agricultural communities. The potential environmental risks of this sequestration strategy are not discussed.

Several measures could be taken to reduce the risk that the market for sinks-based emissions offsets will encourage projects that produce negative environmental externalities. One option is to rely on existing environmental laws and regulatory processes. For example, LULUCF projects could be subject to environmental assessment (EA) processes prior to approval.[99] Modifications to existing EA regimes may be necessary in order to ensure that that they are triggered by LULUCF projects. Another option is the establishment of new review processes specifically designed for LULUCF projects. Finally, exclusion lists and criteria could be developed to identify in advance LULUCF projects that pose unacceptable environmental risks.[100]

f. Land-Use Conflicts

Ensuring the compatibility of LULUCF projects with other land and resource is more than a question of aligning these projects with environmental priorities and values. The risk of land-use conflicts is particularly acute on forested public land, much of which is already subject to overlapping resource tenures and multiple activities. Managing forests for carbon

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www.wbgu.de/wbgu_sn1998_engl.html); IPCC Report, *supra* note 47 at 115, 328.

[96]Griss, *supra* note 69 at 16; Marrakesh Accords, *supra* note 37 at 56.

[97]Griss, *ibid.* at 16.

[98]Federal plan, *supra* note 44 at 40.

[99]IPCC Report, *supra* note 47 at 117-118.

[100]*Ibid*. at 115; Rolfe, *supra* note 35 at 205.

sequestration will further complicate an already complex multiple use paradigm for land and resource use.[101]

In Alberta, for example, the oil and gas industry has a significant footprint on forested land, yet this industry is not subject to the same planning and regulatory requirements as the forestry sector.[102] Changes in forest management designed to increase terrestrial carbon stores could be frustrated by rapidly expanding oil and gas operations, along with other industrial activities and infrastructure development. Coordination across several sectors and among a range of land and resource users may therefore be necessary in order to manage the forested land base for carbon sequestration. Achieving this type of coordination is difficult, however, because resource management and regulatory decision-making tend to be fragmented along sectoral lines.[103]

Despite the increasing prevalence of land-use conflicts within Canada, neither the federal nor the Alberta plans address this issue. Two broad options could be considered when developing the legal and policy framework.

First, existing legal and institutional mechanisms could be directed to address land-use conflicts associated with LULUCF projects. For example, the Alberta Energy and Utilities Board takes account of surface impacts when reviewing applications by owners of subsurface mineral rights to develop energy resources.[104] Terms and conditions are frequently attached to approvals in order to reduce or eliminate these impacts. The Surface Rights Board handles specific compensation claims by landowners.[105] These mechanisms could be adapted to take account of any adverse effects of oil and gas operations on sequestration potential or terrestrial carbon pools. They do not, however, constitute an integrated resource management regime that is capable of managing the full range of land and resource uses across the landscape.[106]

The second option is to incorporate biotic carbon sequestration within a broader framework for integrated resource management that links sectoral decision-making and attempts to anticipate and avoid resource-use conflicts. While the arguments for this approach to environmental and resource management are compelling, it has proven difficult to implement in practice. Alberta's current initiative promoting integrated resource management may have some promise, but it is unclear whether or not it will overcome structural obstacles to integration and

[101]P.N. Duinker *et al.*, "WG4 Summary: Human Dimensions of the Forest-Carbon Issue" in M.J. Apps & D.T. Price (eds.), *Forest Ecosystems, Forest Management and the Global Carbon Cycle*, NATO ASI Series, Subseries I: Global Environmental Change, Vol. 40 (Heidelberg, Germany: Springer-Verlag, 1996) 401 at 408.

[102]M.M. Ross, *Legal and Institutional Responses to Conflicts Involving the Oil and Gas and Forestry Sectors*, CIRL Occasional Paper #10 (Calgary: Canadian Institute of Resources Law, January 2002).

[103]S.A. Kennett & M.M. Ross, "In Search of Public Land Law in Alberta" (1998) 8 *Journal of Environmental Law and Practice* 131.

[104]See, S.A. Kennett, ed., *Canada Energy Law Service – Alberta* (Toronto: Carswell).

[105]A.R. Lucas & C.D. Hunt, *Oil and Gas Law in Canada* (Toronto: Carswell, 1990) at 93-122.

[106]Kennett & Ross, *supra* note 103 at 148-149, 162-167.

produce meaningful changes in decision-making and institutional arrangements.[107] Furthermore, there is no indication that the commitment to promote biotic carbon sequestration that is included in Alberta's climate change plan has been explicitly linked to integrated resource management.

g. Aligning Regulatory Requirements, Policies and Incentives

The legal and policy framework for biotic carbon sequestration should also address existing regulations, policies and incentives that may conflict with the implementation of LULUCF projects.[108] For example, the forest management agreements (FMAs) used to allocate crown timber in much of Canada often include minimum cut levels and other requirements regarding forestry practices.[109] These requirements, along with statutory provisions and resource management policies governing forestry operations, may be inconsistent with managing forests for carbon sequestration. Likewise, relatively short tenures for forestry operators on public land may be a barrier to long-term investment by tenure holders in carbon sequestration.[110] Re-negotiating FMAs and altering the underlying tenure systems, planning processes and regulatory requirements may be necessary to give forest companies the flexibility in operating procedures that is required to increase sequestered carbon.[111]

Subsidies that encourage the conversion of forested land to agricultural uses or urban subdivision may counteract incentives to preserve and enhance carbon sinks.[112] Sectoral growth mandates for specific land and resource uses may also have to be reconsidered in light of their implications for carbon sequestration. A thorough examination of relevant policies, subsidies and other types of incentives should be undertaken as part of a concerted effort to promote a sinks-based regime for emissions credits.[113]

The federal and Alberta plans do not explicitly discuss the possibility that existing legislation and policies that may conflict with objectives for biotic carbon management. The federal plan does refer to a national initiative called Greencover Canada that is intended to improve the management of agricultural land.[114] Among its specific objectives are the conversion of marginal annual cropland to perennial vegetation and the improvement of existing forage and rangeland. This program may provide an opportunity to identify incentives or

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[107]S.A. Kennett, *Integrated Resource Management in Alberta: Past, Present and Benchmarks for the Future*, CIRL Occasional Paper #11 (Calgary: Canadian Institute of Resources Law, 2002).

[108]*IPCC Report*, *supra* note 47 at 303-304; P. Brown, *Climate, Biodiversity, and Forests: Issues and Opportunities Emerging from the Kyoto Protocol* (Washington, DC: World Resources Institute, 1998) at 27.

[109]M.M. Ross, *Forest Management in Canada* (Calgary: Canadian Institute of Resources Law, 1995).

[110]Griss, *supra* note 69 at 3.

[111]NCCP, *supra* note 42 at 60.

[112]Griss, *supra* note 69 at 22

[113]NCCP, *supra* note 42 at 106 (recommendation 4.5).

[114]Federal plan, *supra* note 44 at 40.

requirements in both legislation and policy that run counter to these objectives. Alberta's plan states simply that the government "will pursue a coordinated approach to removing barriers associated with using biological sinks."[115] There is no specific indication that a systematic identification or analysis of legal, policy or institutional barriers has been undertaken or is planned.

h. Collateral Benefits and Strategic Objectives

Many LULUCF projects have the potential to generate collateral environmental benefits.[116] Reforestation projects, for example, may increase biodiversity, reduce erosion and improve flow in watersheds. Measures to increase sequestration in agricultural soils can yield similar benefits. These benefits may not be captured in the price of sinks-based emissions offsets, however, particularly when they are not easily quantifiable in dollars or when they take the form of public goods. The result may be an investment in LULUCF projects that is less than socially optimal. Achieving the full benefits from biotic carbon sequestration may therefore require supplementing the incentives created by the market for sinks-based offsets.

Governments may also have a strategic interest in promoting LULUCF projects in order to meet national limits on net GHG emissions. If market incentives fail to achieve the desired level of sequestration, offsets may have to be created domestically or obtained from other countries through the Kyoto Protocol's flexibility mechanisms. While purchasing foreign credits may in some circumstances be the least costly option, there are also risks and foregone opportunities associated with reliance on this approach. For example, uncertainty regarding the international price of carbon and an unwillingness to transfer money to projects in other countries and forego collateral benefits may induce governments to prefer domestic options. As noted earlier, both the federal and Alberta governments have acknowledged the advantages of implementing domestic measures to reduce net GHG emissions, as opposed to excessive reliance on the purchase of foreign credits.[117]

The use of non-market mechanisms to promote biotic carbon sequestration is included in both the federal and Alberta climate change plans. The federal plan refers to a number of existing initiatives – notably the shelterbelt program and Greencover Canada – that are intended to promote the planting of trees, the conversion of marginal cropland to perennial vegetation, and the improved management of existing forage and rangeland.[118] The federal government is also supporting climate change research, including a study analyzing the potential for afforestation to sequester carbon through the large-scale creation of new forests.[119] More generally, the federal

[115]Alberta Plan, *supra* note 50 at 37.

[116]IPCC Report, *supra* note 47 at 105-118; Brown, *supra* note 108 at 6-7.

[117]*Supra* note 43.

[118]Federal plan, *supra* note 44 at 39-40.

[119]*Ibid*. at 40.

plan includes the "Partnership Fund" to enable it to "co-invest and collaborate on emissions reduction projects."[120]

The Alberta government also states that it will explore the feasibility of a multi-sector fund to create incentives for environmentally sustainable agriculture and forestry practices.[121] If enacted, Bill 32 will establish the Climate Change and Emissions Management Fund, the purposes of which include "the development of opportunities for removal of specified gases from the atmosphere through sequestration by sinks" and the "measurement of the natural removal and storage of carbon".[122] However, neither Alberta's plan nor its draft legislation set out a detailed set of initiatives to supplement market incentives for biotic carbon sequestration.

4. Next Steps for a Legal and Policy Framework

The paper to this point has reviewed eight categories of issues and options that should be considered when developing the legal and policy framework for biotic carbon sequestration in Canada. While some components of the required framework are present in at least embryonic form in the federal and Alberta climate change plans, most of the details remain to be filled in. Initiatives in four broad areas would contribute to putting this framework into place.

A useful first step would be the enactment of comprehensive legislation to establish the legal preconditions for investment in LULUCF projects and trading in sinks-based emissions credits. Some of the required provisions could be incorporated directly into legislation governing forestry, agriculture and other land and resource uses. Biotic carbon sequestration could also be the subject of separate legislation, perhaps building on the approach taken in Alberta's proposed *Climate Change and Emissions Management Act*. The principal objective of legislation would be to establish secure and transferable rights in sequestration potential, terrestrial carbon pools and sinks-based emissions credits. Legislation could play a useful role in reducing transaction costs and ensuring that LULUCF projects in Canada meet the requirements set by the international climate change regime and the needs of market participants.

A second major component of the legal and policy framework is the establishment of a regulatory and certification regime for LULUCF projects and sinks-based offsets.[123] This regime could focus on issues such as the standards and protocols for project design, monitoring and risk management, the transparency of verification processes, carbon accounting methods, and the financial and technical resources of market intermediaries such as project aggregators and emissions banks. The regulatory and certification regime could also include enforcement

[120] *Ibid*. at 16-17.

[121] Alberta plan, *supra* note 50 at 36.

[122] Bill 32, *supra* note 57, ss. 9(2)(e), (f).

[123] P. Moura Costa & M. Stuart, "Issues relating to monitoring, verification and certification of forestry-based carbon offset projects" (June 1999) (available at www.ecosecurities.com).

procedures and remedies to deal with cases of non-compliance, thereby protecting investors and deterring market participants from engaging in negligent or fraudulent conduct.

The third major component of the overall legal and policy framework is a coordinated program of incentives, public sector initiatives and regulatory requirements designed to promote biotic carbon sequestration. As discussed above, the rationale for this non-market intervention is two-fold. First, it addresses the failure of market mechanisms to value collateral benefits from biotic carbon sequestration, notably environmental services that take the form of public goods and promote non-monetary values (e.g., biodiversity and erosion control). Second, governments may have strategic interests in actively promoting domestic LULUCF projects as a means of offsetting GHG emissions.

The final step is to situate carbon sequestration as a GHG management strategy within an integrated approach to resource and environmental management.[124] Carbon sequestration on the scale required to make a meaningful contribution to meeting Canada's climate change obligations will require significant changes in land and resource use. The overall policy context for environmental and resource management will therefore have a major impact on the implementation of LULUCF projects.[125] These projects, in turn, will have implications for a range of values, interests and priorities.[126] Without a legal and policy framework that integrates carbon sequestration with existing patterns of land use and ensures that cumulative environmental effects are managed with a view to longer term environmental and resource management objectives, LULUCF projects may generate increased conflicts over scarce land and resources. Attention to integration could also reduce the risk that efforts to promote these projects may be frustrated by the incentive structures and regulatory requirements that apply to other land and resource uses.

The lack of integration in environmental and resource management is already a significant impediment to the success of efforts by governments in Canada to manage cumulative environmental effects, avoid and resolve resource-use conflicts, and achieve landscape-level objectives.[127] The potential contribution of biotic carbon sequestration to meeting Canada's

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[124]M.A. Cairns & R.A. Meganck, "Carbon Sequestration, Biological Diversity, and Sustainable Development: Integrated Forest Management" (1994) 18 *Environmental Management* 13 at 17-19; R.B. Stewart & J.S. Maini, "Forests and Global Carbon Management: A Policy Perspective" in M.J. Apps & D.T. Price, eds., *Forest Ecosystems, Forest Management and the Global Carbon Cycle*, NATO ASI Series, Subseries I: Global Environmental Change, Vol. 40 (Heidelberg, Germany: Springer-Verlag, 1996) 387 at 395-396; K.R. Richards *et al.*, "Consideration of Country and Forestry/Land-Use Characteristics in Choosing Forestry Instruments to Achieve Climate Change Mitigation Goals" (1997) 27 (Special) *Critical Reviews in Environmental Science and Technology* S47 at S61; D.G. Brand, "Integrating Landscape Management with Climate Change Issues", Paper presented at the Australian Financial Review Third Annual Emission Forum, 29-31 March 2000, Parkroyal Hotel, Sydney (available at www.forest.nsw.gov.au/carbon/papers/integrating/landscape/default.asp).

[125]*IPCC Report*, *supra* note 38 at 27-28.

[126]Richards *et al.*, supra note 124 at S52, S61; H.G. Lund & S. Iremonger "Omissions, Commissions and Decisions: The Need for Integrated Resource Assessments" (2000) 128 *Forest Ecology and Management* 3.

[127]Kennett & Ross, *supra* note 103; S.A. Kennett, *Towards a New Paradigm for Cumulative Effects Management*, CIRL Occasional Paper #8 (Calgary: Canadian Institute of Resources Law, December 1999).

climate change commitments is therefore another compelling reason why governments in this country should be taking concrete steps to fashion integrated resource management regimes and coherent systems of public land law.[128]

5. Conclusion

The governments of Canada and Alberta are currently pursuing energy policies and economic development strategies that rely heavily on the production of fossil fuel for domestic consumption and export. At the same time, they are facing the prospect of a carbon-constrained world where Canada will be required by international law to reduce its net GHG emissions significantly below present levels. The resulting policy challenge is particularly evident in the context of oil sands development. GHG emissions from oil sands projects are expected to increase significantly over the coming years, regardless of the reductions in carbon intensity per unit of production that may be achieved through increased energy efficiency in the production of synthetic crude oil.

Federal and provincial responses to climate change are likely to consist of a variety of measures. This paper focuses on one response – biotic carbon sequestration – that may be used to offset GHG emissions from oil sand development and other sources. Canada has been a leading advocate of LULUCF provisions in the Kyoto Protocol and has sought an expanded role for sinks-based offsets. Its negotiators have secured significant concessions from other parties in this area. The logical next step is to take effective and credible measures to implement these provisions as part of Canada's climate change strategy.

Progress on the domestic legal and policy agenda for a sinks-based offset regime should therefore be a priority. This paper has examined some of the principal issues that should be considered when defining that agenda and has commented briefly on the extent to which these issues are addressed in the federal and Alberta climate change plans that were released in late 2002. The conclusion of this analysis is that these plans contain very little detail on the legal and policy framework for biotic carbon sequestration in Canada. Progress in this area could be focused on the four broad areas for action that were briefly discussed in the previous section.

The issues raised by LULUCF provisions in the Kyoto Protocol are undeniably complex, but they need not be intractable. Furthermore, concrete steps to promote sinks-based offsets could complement efforts in other areas to reconcile the significant increase in GHG emissions from oil sands development with Canada's international obligations. Much attention to date has been focused on international negotiations and on the debate over ratification of the Kyoto Protocol. Progress in these areas should be complemented by increased emphasis on the domestic legal and policy framework for biotic carbon sequestration. Given the environmental and economic issues at stake, the time to begin designing and implementing that framework is now.

[128]S.A. Kennett, "New Directions for Public Land Law" (1998) 8 *Journal of Environmental Law and Practice* 1; Kennett, *supra* note 107.

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