Tar Sands or Scar Sands:

The oil sands are a huge benefit to the Canadian economy but is this at the expense of the environment that is left behind for future generations?

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Abstract

Crude oil is an essential resource for the world. About 40% of the world's total supply of energy, and 95% of the energy used in the transportation industry comes from oil and with global consumption of oil increasing to record highs, and conventional sources of oil dwindling, this makes unconventional sources of oil like the tar sands seem more economically appealing.

Canada's tar sands are in an advantageous and unique position. As the biggest deposit of unconventional oil and gas in the world and sitting in a politically stable source country, there is vast international interest in these reserves. But nevertheless extracting oil from tar sands requires more energy than conventional drilling, meaning more greenhouse gases are emitted before the oil reaches the end user. This in turn creates a host of environmental consequences for the surrounding areas and globally and health and human rights concerns for First Nations.

Producing approximately 96 million barrels per day, and with global oil demand continuing to grow, these reserves are being increasingly exploited. Mechanisms must therefore be in place to ensure sustainable use of these controversial reserves and thought should be given to the needs of current and future generations, as well as preserving the natural environment which may be affected as a result of tar sand production.

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Introduction

Crude oil is an essential resource for the world providing 40% of the Global energy supply. This includes 95% of the energy used in the transportation sector, which means essentially that oil powers virtually every mile that we drive.[1] Global consumption of oil has increased to more than 80 million barrels per day, and with conventional sources of oil dwindling, this makes unconventional sources like the tar sands more economically attractive.[2] Initially, oil sands were considered too expensive and too damaging to the land, yet exploitation of Alberta's oil sands is now considered a 'gamble worth billions',[3] leading to development so enormous that it defies imagination, one that can only be appreciated by orbiting satellites.[4] Due to their unique and advantageous position in a politically stable region, these reserves have particular appeal to investors,[5] only encouraging further expansion, but at what cost?

Whilst the oil companies claim to be investing in "an industry that is now a key contributor to Canada's prosperity" whilst remaining committed to delivering "environmental sustainability",[6] and indeed the Albertan government promoting the "environmentally sustainable" oil sands,[7] this research explores how a limited resource that is being increasingly exploited can indeed be

[1] Union of Concerned Scientists 'Cars, Trucks, and Oil Use', <http://www.ucsusa.org/clean_vehicles/why-clean-cars/oil-use#.Vr32ZvmLRhE> accessed 12th Feb 2016
[2] Kimberly K. Smith, 'Powering Our Future: An Energy Sourcebook for Sustainable Living' (iUniverse: Alternative Energy Institute, 2005) pg 41
[3] National Geographic, 'Scraping Bottom: The Canadian Oil Boom' <http://ngm.nationalgeographic.com/2009/03/canadian-oil-sands/essick-photography> accessed 12th February 2016
[4] Wayne Ellwood, 'No-Nonsense Guide to Degrowth and Sustainability', (New Internationalist Publications Ltd: 1st Edn. 2014) pg 256
[5] 'The Future of the Canadian Oil Sands: Growth potential of a unique resource amidst regulation, egress, cost, and price uncertainty', (February 2016) accessed 19th February 2016
[6] Suncor, 'Oil Sands' (Suncor: 2016) <http://www.suncor.com/about-us/oil-sands> accessed 20th April
[7] Alberta Government, 'Alberta's Clean Energy Story' (Alberta's Oil Sands) <http://www.oilsands.alberta.ca/cleanenergystory.html> accessed 20th April 2016

considered 'sustainable' when surely any finite resource is the exact opposite. Not only are the oil sand reserves limited in themselves, but production requires large amounts of water to separate the oil from the sand, which is heated using natural gas. The Oil Sands extraction process utilizes enough natural gas to heat approximately 3.5 million Canadian homes,[8] exploiting and depleting another finite resource that if used as an alternative could potentially have a less detrimental effect on the environment. Indeed Natural Resources Canada calculated that production could use up to 60% of the nation's natural gas supplies by 2030,[9] demonstrating how this industry is impacting on the sustainability of others.

Further, the exploitation of these reserves are creating a host of environmental issues that appear to be ignored due to the large economic benefit that these reserves have had for the Canadian economy.[10] Whilst the concept of sustainable development suggests that the economy should be a consideration, this must be balanced with the environmental impacts, social opinion and indeed the impact on future generations.[11]

[8] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 12

[9] Natural Resources Canada, Roadmap Workshop on Non-petroleum-based Fuels and Advanced Combustion Research, Ecotourism and Sustainable Tourism Conference (ESTC), Portland, Oregon, November, 2007, as reported in Dirty Oil – How the Tar Sands are Fueling the Global Climate Crisis, Greenpeace, September 2009, p.22; Dan Woynillowicz, Pembina Institute, Oil Sands Fever – The Environmental Implications of Canada's Oil Sand Rush, 2005, p.24; There were 12,437,500 households reported in the 2006 Canadian Census. Human Resources and Skills Development Canada, Canadians in Context – Households and Families, <http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=37> accessed 17 April 2016

[10] 'Environment vs. Economy: The Perpetual Alberta Conundrum' (2012)

[11] United Nations, (1987) Our Common Future - Brundtland Report.

The environmental consequences for future generations are potentially huge in respect to the oil sands, polluting the water,[12] contaminating and disturbing land,[13] increasing greenhouse gas emissions[14] and destroying natural habitats[15]. Moreover, by destroying the boreal forest, an important carbon sink,[16] the issues are not just local, but global. Humans hold the natural and cultural environment of the Earth in common both with other members of the present generation and with other generations, past and future.[17] Yet we are leaving an adverse economy and environment 'as a trust' to future generations, not to mention potential 'clean-up costs'[18] and a massive carbon footprint, which in itself undermines the concept of sustainable

[12] Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[13] Dyer et al., 'Quantifying barrier effects of roads and seismic lines on movements of female woodland caribou in northeastern Alberta', (Can. J. Zool., 2002) 80 pp. 839–845; Grant, J., Angen, E., and Dyer, S. 'Forecasting the impacts of oilsands expansion: measuring the land disturbance, air quality, water use, greenhouse gas emissions, and tailings production associated with each barrel of bitumen production.' (The Pembina Institute, June 2013)

[14] Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf; Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf.

[15] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 7; ITF, 'DIRTY OIL: ALBERTA'S TAR SANDS', (INTERNATIONALTREEFOUNDATION.ORG, Sep 2015) pg. 13; 'TAR SANDS KILLING MIGRATORY BIRDS' 2014, National Wildlife (World Edition), p. 46, Environment Complete, EBSCOhost, viewed 21 May 2016; Shawn Mccarthy & Kelly Cryderman, 'Oil sands pollutants contaminate traditional First Nations' foods: report', (The Globe and Mail, July 2014) <http://www.theglobeandmail.com/news/national/oil-sands-pollutants-affect-first-nations-diets-according-to-study/article19484551/> accessed 21 May 2016; Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016

[16] Webber, M.G., and Flannigan, M.D. 1997. Canadian boreal forest ecosystem structure and function in a changing climate: impact on fire regimes. Environ. Rev. 5: 145–166. doi:10.1139/a97-008

[17] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 8.

[18] Nathan Lemphers, Simon Dyer & Jennifer Grant, 'Toxic Liability: How Albertans Could End Up Paying For Oil Sands Mine Reclamation, (Oil Sands Fever Series, September 2010) < https://www.pembina.org/reports/toxic-liability-report.pdf> accessed 18th January 2016

development and intergenerational equity. This raises the question of what is it regulating this industry?

Sustainable Development provides there should be a balance of three pillars, economic, social and environmental, however the economic pillar appears to be the priority,[19] suggesting the principle of SD is not being enforced effectively as a legal principle. Canada's *Federal Sustainable Development Act 2008*[20] should have given further effect to this principle of environmental law, but it seems to be proving ineffective.[21] This research will therefore aim to establish if the oil sand industry is in breach of Canadian law, and if so, look to the reasons behind why nothing is being done. Furthermore, is this industry in breach of International law? Canada became the first nation to withdraw from the Kyoto protocol,[22] due to the potential monetary consequences for failing to meet their targets,[23] however what other international law regulates the environment? Canada's withdraw from the Kyoto protocol only demonstrates further the issue at hand, and the need for discussion in this area, as essentially it highlights everything wrong with environmental law; the lack of effectiveness, enforceability and consequence.[24]

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[19] 'Environment vs. Economy: The Perpetual Alberta Conundrum' (2012)
[20] Federal Sustainable Development Act 2008
[21] Deborah Schulte, 'FEDERAL SUSTAINABILITY FOR FUTURE GENERATIONS – A REPORT FOLLOWING AN ASSESSMENT OF THE FEDERAL SUSTAINABLE DEVELOPMENT ACT', (Report of the Standing Committee on Environment and Sustainable Development (June 2016) 42nd PARLIAMENT, 1st SESSION
[22] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997
[23] The Telegraph, 'Canada pulls out of Kyoto protocol', (Dec 2011) < http://www.telegraph.co.uk/news/earth/environment/climatechange/8952517/Canada-pulls-out-of-Kyoto-protocol.html> accessed 21st February 2016
[24] Alder et al argue that SD, which is the basis of environmental law as a whole, is too broad and largely ineffective, thus making environmental law ineffective. Source: Alder et al, 'Environmental Law and Ethics'. (Basingstoke, Macmillan Press, 1990); Shelton et al argue that the judiciary need to understand this new area of law and have a creative method of dealing with this new area. Without this, environmental law is ineffective in its development and effectiveness. Source: Shelton et al, 'Judicial Handbook on Environmental Law', (UNEP: Earth Print Limited, 2005) pg xxi.

Perhaps this is the same reason behind the apparent lack of resolve over the numerous treaty violations suffered by the First Nations communities.[25] The majority of the oil sands extraction and production is occurring on the indigenous people's traditional territories, land in which they have constitutionally guaranteed rights to access for hunting, gathering and performing ceremonies.[26] Yet despite repeatedly suing oil companies and the provincial and federal governments over new projects and policies,[27] nothing concrete has been done. This further supports the notion that the economic benefit is tipping the scale, as production is allowed to continue despite the controversial treaty violations.[28]

A sustainable path, it is argued, would be to strike a balance between different stakeholder needs, which are influenced by the different positive and negative impacts encountered in any of the three pillars of sustainable development,[29] and look to ways that could 'green' this industry, thus improving the legality and reducing the negative world being left behind for future generations. Production of tar sand oil is set to increase to 3.5 million barrels per day, or 4% annually, by 2030,[30] rising to around 5 million soon thereafter, providing Alberta with 90 years'

[25] Lizzie Gunggoll, 'Standing Our Sacred Ground – First Nations, Tribal Leaders & Land Owners Send Message To Canada, Stop Tar Sands At The Source', (First Peoples Worldwide, April 2014)
[26] Audrea Lim, 'Canada First Nations fight 'broken' system for green lighting oil projects', (Aljazeera America: July 2015) < http://america.aljazeera.com/multimedia/2015/7/canada-first-nations-say-system-for-approving-oil-projects-is-broken.html> accessed 20th April 2016
[27] Ibid.
[28] Lizzie Gunggoll, 'Standing Our Sacred Ground – First Nations, Tribal Leaders & Land Owners Send Message To Canada, Stop Tar Sands At The Source', (First Peoples Worldwide, April 2014)
[29] Poveda, C.A., Lipsett, M.G., 'The Canadian oil sands: Environmental, economic, social, health, and other impacts', (Sustainable Development and Planning VI 575) pg 578.
[30] Energy Global, 'Crude oil forecast to 2030 from CAPP', (Energy Global, Hydrocarbon Processing, 2014) <https://www.energyglobal.com/downstream/gas-processing/10062014/capp_crude_oil_to_2030/> accessed 30th January 2017

worth of reserves.[31] It is imperative to take action now and ensure the opportunity to undo the damage already done is not missed.

[31] G Cornelis van Kooten, 'Pipelines and Canada's Oil Sands', (Department of Economics, University of Victoria. 2012) pg 1

Aims and Objectives

This thesis aims to discuss and analyse the sustainability of the Canadian oil sand industry in light of key legal principles, including sustainable development and intergenerational equity. The oil sands will be used as a case study to provide a scientific and legal discussion regarding the effectiveness of international environmental law, as well as seeking to establish the future position of this industry.

In order to analyse the sustainability of this industry, and the effectiveness of international legislation, this research will look to the following objectives:

1. Critically discuss the history of the Canadian oil sands and the methods used to extract the bitumen from the sand.
2. Define the environmental impacts caused by the oil sands industry at a local, national and international level, particularly on ecosystems, habitats and wildlife.
3. Establish the wider resulting impacts of this industry in relation to society and human health, looking at First Nations as an example of those directly affected. Discuss this in relation to principles of environmental justice and human rights.
4. Define the principles of sustainable development and intergenerational equity, and analyse Canadian legislation surrounding the oil sand industry in relation to these principles.
5. Consider ethical and moral concerns regarding the oil sands industry, and if a crime of ecocide could provide a remedy.
6. Finally, make recommendations for the future of this industry, highlighting the legality and compliance with principles of environmental law, and areas for reform.

Methodology

This research relies primarily on a desk-based critical analysis of black letter law and relevant case law, evaluating environmental law and policy in Canada and internationally, with a further evaluation and analysis of international environmental principles. In addition, this research evaluated data and figures relating to Energy Return on Investment, carbon emissions and pollution, and supply and demand, provided by organisations and/or other stakeholders.

This research firstly involved a desk-based literature review, discussing the history of the Canadian oil sand industry, also utilising reports from a variety of governmental organisations and NGO's, in order to conduct a critical analysis of air quality guidelines and environmental risks. The effects on ecosystems, habitat disturbance and indigenous health was also analysed using information gathered from a variety of sources, including legal and scientific journals, books, web based searches, and through Bournemouth University's library resources including Westlaw, Lexis Library, Science Direct, Environment Complete and EBSCO database.

The next part of this research involved a black letter law analysis of international environmental treaties, in particular the Kyoto Protocol and the Rio and Stockholm declarations, and environmental principles such as inter and intra-generational equity, Sustainable Development, indigenous rights and ecocide. This research found an evident lack of enforceability and subjectivity of treaties and principles of environmental law, and as such, peer reviewed academic literature was used to aid this research, providing firm evidence to underpin the arguments regarding the legal, scientific and sociological issues that may have been overlooked. This research made use of published data, highlighting the weaknesses in those assumptions when possible to provide a balanced, non-biased piece of research.

Finally, this research made recommendations for the future of the oil sand industry, using policy based reasoning and academic opinion for formulating these recommendations, based on the findings of the research.

The above mentioned sources were used as primary research, allowing for a critical discussion to create a balanced argument. Online search engines, such as Westlaw and Lexis Nexus, along with scientific databases such as Scopus and Web of Science were used for the research, as well as peer reviewed articles. Information regarding major operators of oil sands projects were gathered specifically through their websites to aid with facts and statistics. Whilst each source may have an agenda, research from a variety of different sources provided a balanced and credible understanding from experts in the industry. These sources were critically analysed against black letter law and peer reviewed articles in order to provide a balance and accurate piece of research.

Doctrinal research, or black letter law, is primarily concerned with the formulation of legal doctrines through the analysis of legal rules, statutory instruments and sources of law, and as such, must be applied to a given situation to establish gaps or ambiguities within the law.[32] Methods of doctrinal research are characterised by the study of legal texts and are therefore often described as 'black-letter law'.[33] Black letter law is concerned with the formation, creation and development of legal doctrines for publication in textbooks or journal articles and its research questions take the form of asking 'what is the law?' in particular contexts.[34] Black letter

[32] Paul Chynoweth, '*Legal research in the built environment: a methodological framework*' (2008) pg 29
[33] Ibid
[34] Ibid

law is therefore extremely important when analysing the law as it allows for context to be added to existing legal rules in order to provide an accurate and acceptable argument.[35]

A literature and doctrinal method of research draws solely on data that has already been collected, analysed and peer-reviewed, using a systematic analysis of quality research that is readily available.[36] A primarily literature based piece of research therefore enabled a wide range of sources to be utilised, giving a thorough and in-depth understanding of existing knowledge of the oil sands. Whilst a wholly literature based piece of research could be seen to be biased or lacking scientific evidence, this research alleviates those concerns by analysing the literature against a variety of scientific studies and black letter law. *Mulrow* argues this is 'finding the truth', and is therefore a 'fundamentally scientific approach'.[37]

As a form of doctrinal research, this research established what the law is in relation to the Canadian oil sands, where the gaps are based on current sources of law, and what pieces of law can provide a potential remedy to the issues discovered throughout the research. The end result of this research is an academic, legal opinion, based upon the current knowledge available; whilst naturally this may contain many uncertainties and be speculative in nature, the scientific consensus is that climate change is a very real threat and if the negatives are to be kept to a minimum, action must be taken on the information that is immediately available. Therefore this research made conclusions from academics, scientists and a wide variety of reputable sources

[35] Fiona Cowie, '*Legal Academics: Cultures and Identities*' (Hart Publishing, 1st Edn, 2004) pgs 55-56
[36] Andrew Booth, Anthea Sutton & Diana Papaioannou, '*Systematic Approaches to a Successful Literature Review*', (Sage, 2nd Edn, 2016)
[37] Mulrow, C.D. '*Rationale for systematic reviews*', (Systematic Reviews, BMJ Publishing Group, 1995)

to create a well-founded, scientific and credible piece of research, in order to advise this industry of its legal, scientific and moral position.

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Chapter One

An Overview of the Industry

1.1 What are the tar sands?

Scientifically speaking, the tar sands, also referred to as oil sands, are a combination of 85% sand, clay, and silt, 5% water, and 10% bitumen,[38] a tar-like substance that can be converted to oil. These reserves are the third-largest proven crude oil reserve in the world, after Saudi Arabia and Venezuela,[39] making up 30% of total world reserves.[40] They can be mined and processed to extract the bitumen, which is then refined into oil. Whilst the oil sands are considered part of the 'clean energy future',[41] extracting oil from the tar sands requires a good deal more energy than conventional drilling, which means more greenhouse gases before the oil reaches the pump.[42] The bitumen in tar sands cannot be pumped from the ground in its natural state because it is extremely viscous, so it doesn't flow like crude oil.[43] Therefore the sand deposits are mined, usually by strip mining or open pit techniques, using heat or solvents to extract the oil from the sands.[44] However, the extraction process is messy and requires huge quantities of

[38] Chevron: War, Warming, Toxics and Human Rights. <https://bayareadirectaction.files.wordpress.com/2008/02/chevron-fact-sheet.pdf>
[39] BP Global, 'Oil sands' (BP's 2014 Assurance Statement) <http://www.bp.com/en/global/corporate/sustainability/the-energy-future/oil-sands.html>
[40] Alboudwarej, H. et al. 'Highlighting Heavy Oil, Schlumberger Oilfield Review, 2006, 18, 34-53
[41] Albert Government, 'Alberta's Oil Sands', http://oilsands.alberta.ca/cleanenergyfuture.html acceded 30th January 2016
[42] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 13th January 2016
[43] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.
[44] Ibid.

water and energy[45] and 80% of the deposits are not recoverable in their natural state, thus requiring *in situ* recovery. In this case, these reserves must be upgraded and pumped through pipelines to be refined.[46] Naturally the transportation of large amounts of oil is a danger in itself, and can create a host of environmental problems if it were to go wrong.

So how is it that this natural resource has gone from being described as part of the 'clean energy future',[47] and marketed by Alberta Energy as an environmentally friendly form of energy,[48] to "one of the dirtiest and most destructive forms of energy on the planet"?[49]

1.2 History

The earliest known usage of the Canadian tar sands dates back almost 300 years to the local Aboriginal people,[50] who used the bitumen from the tar sands to waterproof their reed boats and to construct buildings,[51] but in 1875 the method of water naturally washing the oil out of the sands was first seen. John Macoun led the first government-sponsored expedition of the area, and observed water naturally washing oil out of the tar sands,[52] which is the same method

[45] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016

[46] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[47] Albert Government, 'Alberta's Oil Sands', <http://oilsands.alberta.ca/cleanenergyfuture.html> acceded 30th January 2016

[48] Albert Energy, ' Environment', <http://www.energy.alberta.ca/OilSands/1709.asp> accessed 2nd January 2017

[49] Tar Sands Solutions, 'What's the Problem with the Tar Sands?' (TSS: Tar Sands Solutions Network) < http://tarsandssolutions.org/tar-sands> accessed 12th January 2016

[50] The documented history of the tar sands dates back nearly three centuries to 1717, when Waupisoo of the Cree people brought samples of the oil sands to the Hudson's Bay Company trading post at Fort Churchill. Source: RAMP, 'History of the Oil Sands' (RAMP: Regional Aquatics Monitoring Program) <http://www.ramp-alberta.org/resources/development/mining.aspx> accessed: 12th January 2016

[51] C. A. Poveda & M. G. Lipsett, 'Surface Mining Operations in Oil Sands: Establishing Sustainable Development Indicators (SDI's)', (WTI Press, 2014) pg 97

[52] Alain-Yves Huc, 'Heavy Crude Oils: From Geology to Upgrading: an Overview', (Tachnip Editions, 2011) pg 84

used for extraction today. Robert Bell conducted a second survey of the area, recognising a potentially valuable petroleum resource and gave samples to a chemist named G. Christian Hoffman, who was successful in separating bitumen from the oil sands using water.[53] After ascertaining that there were large underground reservoirs, and several unsuccessful attempts to locate them, Alfred von Hammerstein was the first person to drill for oil near Fort McMurray, but he discovered salt deposits and natural gas instead.[54]

According to RAMP Alberta,[55] the concern over Canada's dependence of foreign oil during World War 1 was the catalyst for discovering the nation's oil resources[56] so after WW1, the Alberta Research Council (ARC) was formed by the government to support oil sands research.[57] Dr Karl Clark's hot water flotation method, involving mixing oil sands with hot water and aerating the resulting slurry in order to separate the bitumen froth from the sand, was then formed.[58] Sidney Ells also began working on a new method for extracting the bitumen from the tar sands using hot water, however Clark and his associate Sidney M. Blair successfully separated the oil from the tar sands, and in 1928 the two were granted a patent for their hot water process.[59]

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[53] C. A. Poveda & M. G. Lipsett, 'Surface Mining Operations in Oil Sands: Establishing Sustainable Development Indicators (SDI's)', (WTI Press, 2014) pg 97

[54] Alberta Culture and Tourism, 'Alfred von Hammerstein', <http://history.alberta.ca/energyheritage/sands/unlocking-the-potential/independent-experiments/alfred-von-hammerstein.aspx> accessed 2nd January 2017

[55] RAMP is an industry-funded, stakeholder environmental monitoring program initiated in 1997, who intend to integrate aquatic monitoring activities across different components of the aquatic environment. Source: RAMP, 'Regional Aquatics Monitoring Program' (RAMP: Regional Aquatics Monitoring Program) <http://www.ramp-alberta.org/ramp.aspx> accessed 7th January 2017

[56] RAMP, 'History of the Oil Sands' (RAMP: Regional Aquatics Monitoring Program) <http://www.ramp-alberta.org/resources/development/mining.aspx> accessed: 2nd January 2017

[57] Ibid

[58] Ibid

[59] This involved mixing oil sands with hot water and aerating the resulting slurry, which led to separation of bitumen froth from the sand. Source: RAMP, 'History of the Oil Sands' (RAMP: Regional Aquatics Monitoring Program) < http://www.ramp-alberta.org/resources/development/mining.aspx> accessed: 12th January 2016

Based on Clark's design, Robert Fitzsimmons constructed a small hot-water separation plant, producing about 300 barrels of bitumen with a seven-man crew and so in 1930 the first commercial sale of bitumen from the oil sands occurred.[60] After many other failed ventures, in 1964 approval was granted to Great Canadian Oil Sands Company (Suncor Energy Inc.) for the first tar sands project, with production beginning in 1967.[61] Their mission:

> *"To produce a reliable, long-term energy supply while leveraging technology to minimize environmental and social impacts of resource development in the Athabasca region."*[62]

Whist this mission touches on elements of sustainable development, aiming to incorporate a sustainable long term source of energy with environmental damage and social impacts, there is no mention of the forth element of SD; there is no mention of future generations. However, in 1978 Syncrude Canada Ltd began production and over the next few decades production in Fort McMurray expanded significantly. The population of this once small town grew from 300 in the early 1900's to 65,000 people with an industry worth $30 billion, with $15 billion worth of projects under construction.[63]

1.3 Production

The tar sands generate oil similar to that pumped from conventional oil wells, but extracting oil from tar sands is more complex than conventional oil recovery and is 'a messy job', with

[60] Ibid.
[61] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.
[62] Suncor, 'Mining' <http://www.suncor.com/en/about/257.aspx> accessed 12th January 2016
[63] Laura S. Nelson & Tim J. Wall, 'Development of Utah Oil Shale and Tar Sands Resources' (Utah Mining Association, October 2008) <http://www.circleofblue.org/waternews/wp-content/uploads/2010/08/UMA-White-Paper-on-Development-of-Utah-OS-TS.pdf> accessed: 12th January 2016

companies essentially 'scraping the bottom of the oil barrel' in order to maximise the economic gain.[64] Oil sands recovery processes include extraction and separation systems to separate the bitumen from the clay, sand, and water that make up the tar sands, however the technology relied on today is very similar to that used in the early 20th century,[65] and there have been little developments to the extraction process itself.[66] However, the 1990's saw the introduction of new methods that improved the efficiency, thus making the process more cost effective.[67] This involved using large hydraulic and electrically powered shovel to dig up the tar sands and load them into enormous trucks that can carry up to 320 tons of tar sands per load. After transportation to an extraction plant, a hot water process separates the bitumen from sand, water, and minerals.[68] This relies on the initial extraction approach that has been used for the past century, demonstrating a lack of development in this area.

Around 75% of the bitumen can be recovered, but the other 25%, along with other waste materials, including waste water, are then returned to the mines. At a later stage this land will be reclaimed, and money has been set aside to do just this. However remediation of the land[69]

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[64] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016

[65] This process is a hot-water-based separation process that requires huge quantities of water and energy.

[66] Ibid.

[67] Argonne National Laboratory, 'About Tar Sands' (2012 Oil Shale & Tar Sands Programmatic EIS) <http://ostseis.anl.gov/guide/tarsands/> accessed 12th January 2016

[68] The separation takes place in separation cells. Hot water is added to the sand, and the resulting slurry is piped to the extraction plant where it is agitated. The combination of hot water and agitation releases bitumen from the oil sand, and causes tiny air bubbles to attach to the bitumen droplets, that float to the top of the separation vessel, where the bitumen can be skimmed off. Further processing removes residual water and solids. The bitumen is then transported and eventually upgraded into synthetic crude oil. Source: Argonne National Laboratory, 'About Tar Sands' (2012 Oil Shale & Tar Sands Programmatic EIS) <http://ostseis.anl.gov/guide/tarsands/> accessed 12th January 2016

[69] Remediation (or reclamation in the context of the oil sands) refers to the action of remedying something, in this context reversing or stopping environmental damage. This is referred to as reclamation throughout sources however, remediation is the more appropriate term in this context so will be referred to as this throughout.

is yet to occur in any significant scale.[70] The industry is legally obligated to reclaim or restore all disturbed land to a productive state, and return it to the Government of Alberta, but these mines are often in operation for decades and remediation activities on these sites can subsequently take decades to complete. So far, of the 14 or so energy companies' surface mining the oil sands, Syncrude is the only company that has been granted a reclamation certificate.[71] Of the 18,653 hectares of disturbed land, a mere 4055 hectares has been 'reclaimed'. Indeed remediation of the tar sands region will be a large-scale experiment that is unlikely to restore a self-sustaining boreal forest ecosystem within the next century.[72] This is the legacy that the industry is leaving to future generations, a legacy largely incompatible with SD.

1.3.1 Scale of Production

In 2003 it was recognised that the Canadian reserves were the second largest in the world, in terms of crude oil, behind Saudi Arabia,[73] and a recent recalculation has revealed that the amount of oil buried underneath the ground in northern Alberta are in the region of 180 billion

[70] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 365, Environment Complete, EBSCOhost, viewed 16 April 2016; Alberta Energy 2013, 2014

[71] Brett Purdy, (Alberta Environment)

[72] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 30th January 2016

[73] Gale Group, 'The Alberta Oil Sands' (Gale Canada in Context, Cengage Learning, 2007) <http://ic.galegroup.com/ic/cic/ReferenceDetailsPage/ReferenceDetailsWindow?failOverType=&query=&windowstate=normal&contentModules=&display-query=&mode=view&displayGroupName=Reference&limiter=&currPage=&disableHighlighting=true&displayGroups=&sortBy=&search_within_results=&p=CIC&action=e&catId=GALE%7C00000000MII2&activityType=&scanId=&documentId=GALE%7CEJ2181600001&source=Bookmark&u=albertak12&jsid=098a6f25f5dae4eea95aea435d86094a> accessed 12th January 2016

barrels,[74] with 166 billion barrels located in the oil sands.[75] *Figure 1* represents the vast reserves that currently remain unrecoverable, however technological breakthroughs, such as TAGD technology,[76] is changing this and in turn adding another few hundred billion or so more reserves to Canada's recoverable supply.[77] If these technological developments achieve this, then the scale of environmental impacts will also be on the increase, and based on the scale of these reserves in *Figure 1* this could have catastrophic consequences.

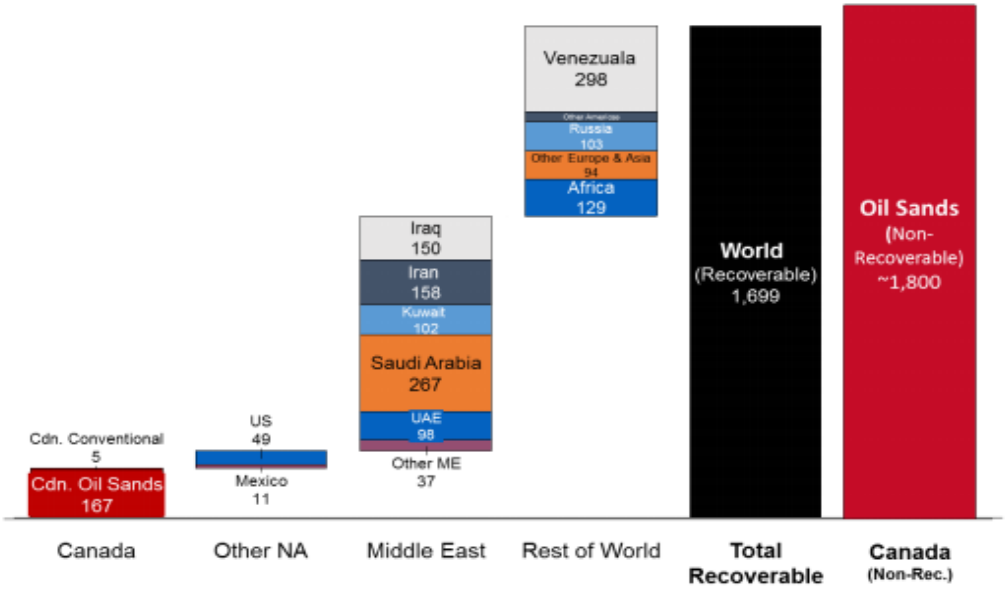

Figure 1. *Oi Sands Reserves Amid Global Reserves (Billions BBL)*[78]

[74] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[75] CAPP, 'The Facts on Oil Sands 2015', (August 2015); AER 2015 and Oil and Gas Journal 2014.

[76] Athabasca Oil Corp. has developed proprietary in situ technology (Thermal Assisted Gravity Drainage (TAGD) to extract bitumen from carbonates by using electrical cables to heat bitumen, enabling oil to flow to the surface. Source: Spark Digest, 'TAGD Technology Successful in Leduc Bitumen Recovery for Athabasca Oil', (Dover West, AB. September 30, 2012) <http://spark.canadiandiscovery.com/activity-review/tagd-technology-successful-leduc-bitumen-recovery-athabasca-oil> accessed 7th January 2017

[77] Oxford Institute for Energy Studies, 'The Future of the Canadian Oil Sands', (The University of Oxford. February 2016) pg 62

[78] BP Statistical Review, June 2015.

As of 2015, oil sands production (mined and in situ) peaked at approximately 2.5 million barrels per day,[79] which could suggest why in 2011, the Canadian government formally withdrew from the Kyoto protocol.[80] For a nation who pride themselves on being one dedicated to climate change, this bold move has left global climate change experts feeling they lack credibility in this regard.[81]

Nevertheless projections showed that as much as 36% of American oil could originate from Canadian oil sands by 2030,[82] prompting the suggestion that this source of oil will go from "being a fringe energy source to being one of strategic importance."[83] This argument is strengthened by the implications of the gulf oil spill, which has created uncertainties and difficulties when obtaining oil permits for overseas drilling.[84] Canada has therefore became a hub for oil and a key supplier to the US, strengthening their strong trading relationship and ensuring that the US feel the economic benefit as well. The current state of political volatility is raising concerns over prices and supply making Canada a stable and viable supplier of oil, however the longevity of this in light of Donald Trump's plans for the fracking industry in the US is called into question. Trump plans to harness fracking for 'American energy independence', thus providing energy

[79] Alberta Energy Regulator (AER) ST 98; National Energy Board, 'Market Snapshot: Oil Sands Production to Increase, but Effects of Low Oil Prices are Evident', (NEB, 2016) <https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/snpsht/2015/12-03lsndsprdctn-eng.html?=undefined&wbdisable=true> accessed 12th March 2017

[80] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997

[81] Bruce Cheadle, 'Equal playing field needed in climate deal: Harper' (The Canadian Press, November 14, 2009)

[82] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012)
< http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 13th January 2016

[83] Daniel Yergin, an oil historian and chairman of IHS CERA. Source: Michael Klare, 'The Race for What's Left: The Global Scramble for the World's Last Resources, (2012)

[84] Ibid

security for the US,[85] but could this be history repeating itself? Many environmentalists would agree.[86] Without US demand, how necessary is this 'dirty oil'?

However, whilst the source country may indeed be stable, the reserves are not. With proven reserves in the region of 166-180 billion barrels,[87] this is enough oil to supply the United States requirements for about 23 years, or Canadian consumption for about 500 years.[88] At the current production rate of 2.5 million barrels per day,[89] the oil sands have a lifespan of 180 years. However, at the projected production rate of 10 million barrels per day the oil sands life span is under 50 years,[90] suggesting this industry is unable to supply the demand. This demonstrates a lack of long term sustainability, the oil sands will not be a long term source of oil, acting counter to the intension to "produce a long-term energy supply".[91] This will certainly be the case if reliance on Canadian oil continues to grow, as reserves can only go so far. Some critics believe that dependence on the oil sands, which accounts for 47% of the total amount of oil produced in Canada, is simply "throwing all eggs in one small, risky basket,"[92] suggesting that developing

[85] Tom Burson, 'Point/Counterpoint: Dissecting Trump's Fracking Policy', (Paste Magazine, 2017) <https://www.pastemagazine.com/articles/2017/01/pointcounterpoint-is-fracking-the-right-way-of-the.html> accessed 6th March 2017

[86] Ibid; Andrew Nikiforuk, 'Slick Water: Fracking and One Insider's Stand against the World's Most Powerful Industry', (Greystone Books, 1st Edn, 2015); McDermott-Levy, R., Kaktins, N. and Sattler, B., 2013. Fracking, the environment, and health. AJN The American Journal of Nursing, 113(6), pp.45-51.

[87] Alberta Energy, 'Facts and Statistics', (Alberta Energy. 2017) <http://www.energy.alberta.ca/oilsands/791.asp> accessed 7th January 2017

[88] Canadians for a Sustainable Society, 'Oil Sands', (Sustainable Society. 2017) <http://sustainablesociety.com/environment/oil-sands#.WHEbq1OLTIU> accessed 7th January 2017

[89] National Energy Board, 'Market Snapshot: Oil Sands Production to Increase, but Effects of Low Oil Prices are Evident', (NEB, 2016) <https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/snpsht/2015/12-03lsndsprdctn-eng.html?=undefined&wbdisable=true> accessed 12th March 2017

[90] Ibid

[91] Suncor, 'Mining' <http://www.suncor.com/en/about/257.aspx> accessed 12th January 2016

[92] Climate Access, FAR FROM INEVITABLE: The Risks of and Barriers to Tar Sands Expansion, (December 2014) < http://www.climateaccess.org/sites/default/files/ED%20NRDC_Far%20From%20Inevitable.pdf> accessed 19th January 2016

and utilising a more sustainable long-term source of energy would be the safer option. However, the alternative of developing the 'unrecoverable' reserves could see the longevity of this industry vastly increased, and if successful this could have numerous benefits.

1.4 Benefits of Tar Sand Production

The oil reserves still remain one of the largest in the world and will ensure Canada remains economically successful for many years to come, easing earlier concerns surrounding reliance on foreign oil. But once labelled 'economically recoverable',[9394] in 2004 it was found crude oil prices must remain over $70/barrel in order to remain so.[95] As of 2017, to remain economically viable crude oil must remain between $55-$79/barrel,[96] yet it is expected the cost will reduce to $16/barrel 2020-2025,[97] suggesting this industry is no longer economically sustainable.

Despite this, the oil sands currently remain viable with exports at an all-time high, and the demand will ensure that oil prices remain relatively low for the foreseeable future.[98] With only a small percentage having produced to date there is still enormous growth potential as per *Figure 1*, particularly if the non-recoverable reserves can be recovered. Indeed, more than two thirds of European oil refineries have now been equipped to now deal with oil derived from the

[93] Peter Sale, 'Our Dying Planet: An Ecologist's View of the Crisis We Face', (University of California Preaa, 2011) pg 241;
[94] This suggests the methods of extraction are technologically or financially feasible to extract.
[95] Liang-Shih Fan, 'Chemical Looping Systems for Fossil Energy Conversions', (John Wiley & Sons, 2010) pg 5
[96] Boskovic et al, 'Leave it in the ground? Incorporating the social cost of carbon into oil sands development', (February, 2017) pg 13
[97] Pg 9
[98] In 2016 a barrel of bitumen sold for $8.35, conventional crude oil normally sells for around $30 a barrel. Source: Crude Oil and Commodity Prices (February 2016) <http://www.oil-price.net/> accessed 13th February 2016

Canadian tar sands,[99] which suggests there is global support for exploitation of this resource. The low cost of this oil throughout Europe could potentially lead nations to overlook the glaringly obvious lack of longevity and the environmental issues that have been caused by this 'dirty oil'[100] as the cheap oil prices spread internationally, raising fears that the EU is ready to welcome a flood of imports of one of the most environmentally devastating fuels in production.[101]

Perhaps one of the reasons for such western support stems from the stability and reliability of the source. It is very uncommon to have such large reserves in a stable westernised country and that may seem appealing to countries 'cut from the same cloth'. Indeed Canada is the United States' most secure supplier of oil, and the oil sands helps the US reduce their dependence on 'foreign oil', yet this is still foreign to them and is far from secure.[102] Although Canada is a stable source country, the prices of oil are far from stable, they are based on supply and demand, making them 'volatile and unpredictable'.[103] To be profitable, prices need to remain $55-

[99] James Crisp, 'Two thirds of European oil refineries ready for tar sands imports' (EurActiv, 25th November 2015) < http://www.euractiv.com/sections/energy/two-thirds-european-oil-refineries-ready-tar-sands-imports-319794> accessed 17th January 2016

[100] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 13th January 2016

[101] James Crisp, 'Two thirds of European oil refineries ready for tar sands imports' (EurActiv, 25th November 2015) < http://www.euractiv.com/sections/energy/two-thirds-european-oil-refineries-ready-tar-sands-imports-319794> accessed 17th January 2016

[102] Government of Canada, (2011). Oil Sands; A strategic resource for Canada, North America and the global market. Available at: http://www.nrcan.gc.ca/energy/sites/www.nrcan.gc.ca.energy/files/files/OilSands-EnergySecurityEconomicBenefits_e.pdf/

[103] Scott Sutherland, 'Exchanging Oil Sands Expansion for Renewable Energy Growth in Canada', (2015, VOL. 7 NO. 01) < http://www.studentpulse.com/articles/978/2/exchanging-oil-sands-expansion-for-renewable-energy-growth-in-canada> accessed 13th February 2016

$79/barrel if not higher,[104] but in 2016 a barrel of oil sand oil sold for $8.35,[105] and prices as of 2017 have remained consistently between $50-$55/barrel, demonstrating that relying so heavily on such a risky industry could end up a detriment to the Canadian economy, not a benefit. That being said, "the oil sands business is the ultimate marathon, it requires fitness, endurance, strategic pacing, and discipline",[106] with success depending both on the global crude supply and demand fundamentals, and the ability to improve production capability over time.[107]

Indeed, Chinese investors find this resource attractive since Canada is considered to be 'politically stable region'[108] when compared with oil from the Middle East.[109] Between 2005 and 2015, Chinese private companies and state-owned enterprises invested $40 billion in Canadian energy assets but the flow of foreign investment has now tapered off and "it's not realistic to expect that the Chinese will accept large oil sands deals as minority players".[110] Canada boasts a stable regulatory framework and is the largest holder of proven reserves not controlled by a state-owned company. This is a potent combination that will drive hundreds of billions of dollars

[104] National Energy Board, (2011). Canada's Energy Future: Energy supply and demand projects to 2035. Available at: http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/2011/nrgsppldmndprjctn2035-eng.pdf/; Boskovic et al, 'Leave it in the ground? Incorporating the social cost of carbon into oil sands development', (February, 2017) pg 13

[105] Crude Oil and Commodity Prices (February 2016) <http://www.oil-price.net/> accessed 13th February 2016

[106] Cattaneo, Claudia. 2015. 'King Of Pain: Steve Williams Seizes On Price Pangs To Prepare Suncor For Oilsands Dominance'. The National Post.

[107] 'The Future of the Canadian Oil Sands: Growth potential of a unique resource amidst regulation, egress, cost, and price uncertainty', (February 2016) accessed 19th February 2016

[108] Ibid.

[109] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 13th January 2016

[110] Jesse Snyder, After a decade of Canadian investment, China is pulling back. What now? (ALBERTA OIL, 23rd June 2015) < http://www.albertaoilmagazine.com/2015/06/china-pulls-back-on-canadian-investment/> accessed 18th January 2016

of investment in the years to come,[111] suggesting that Canada could be financially sustainable for the foreseeable future.

Yet surely that makes the environmental problems caused by the tar sands seem even worse; the economy in Canada was already stable and growing prior to the start of oil sand production. The steady industrialization of the economy saw low unemployment in the 1960's with many workers in well paid jobs.[112] Agriculture was their dominant industry, with many others growing, including lumber, paper and printing, tobacco products and vehicle manufacturing.[113] Further, Canada had enough education and knowledge surrounding climate change to sign up to the Kyoto Protocol in 1997 and commit themselves, as a nation, to reducing their carbon emissions.[114] They are knowledgeable enough to know that as a result of developing the oil, Alberta's emissions, with only 10% of the population in that province, emits the most GHG emissions of any province in Canada. Alberta's emissions roughly account for one third of Canada's overall CO_2 emissions.[115] That has increased by 18% between 1990 and 2013 (*figure 2*),[116] making Canada appear driven only by the 'economic pillar' of sustainability, with little or no thought to the environmental pillar or the future generations' needs. This economic driver is the root cause behind Canada's performance being labelled 'the worst in the western world'

[111] The Conference Board of Canada, Fuel for Thought: The Economic Benefits of Oil Sands Investment for Canada's Regions (Economic Performance and Trends, October 2012) <https://www.albertacanada.com/files/albertacanada/AIS_FuelforThought.pdfL> accessed 23rd January 2016

[112] Statistics Canada, 'Economic gains', <http://www65.statcan.gc.ca/acyb01/acyb01_0004-eng.htm> accessed 7th January 2017

[113] Ibid

[114] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997

[115] Environmental Defence Fund, The World's Carbon Markets: A Case Study Guide to Emissions Trading (May 2013) pg 1

[116] Environment and Climate Change Canada, 'National Greenhouse Gas Emissions' <https://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=FBF8455E-1> accessed 13th February 2016

with the highest emissions per capita,[117] and under the Brundtland concept of SD[118] these actions could indeed be illegal if the principle of SD was legally binding in Canada; the legality of this industry will be discussed in more detail in Chapter Four.

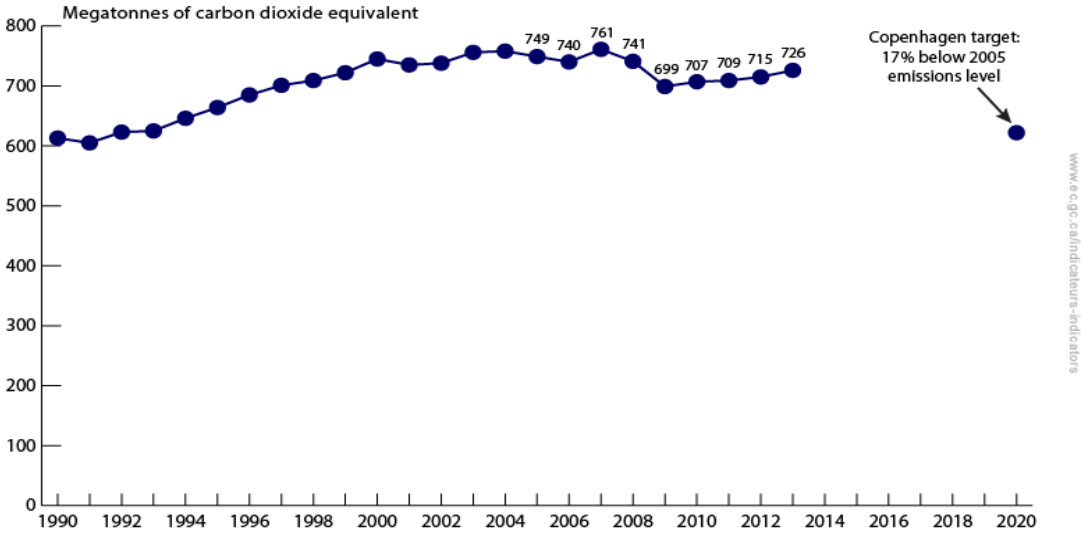

Figure 2. *National greenhouse gas emissions, Canada, 1990 to 2013*[119]

The increase in Canadian emissions has led one NASA climatologist to label Canadas move to 'one of the dirtiest, most carbon-intensive fuels on the planet' as a step in the wrong direction, indicating that the governments, both national and provincial, either do not understand the severity of the situation or they simply do not care.[120] The move to remove itself from the Kyoto protocol would suggest Canada was well aware that their emissions would rise in line with oil sands expansion and despite this, they were prepared to sacrifice this in order to expand

[117] Climate 5 - Oil Sands Reality Check
[118] United Nations, (1987) Our Common Future - Brundtland Report.
[119] Environment and Climate Change Canada, 'National Greenhouse Gas Emissions' <https://www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=FBF8455E-1> accessed 13th February 2016
[120] James Hansen Source: David Biello, How Much Will Tar Sands Oil Add to Global Warming? (Scientific American, 23rd January 2013) <http://www.scientificamerican.com/article/tar-sands-and-keystone-xl-pipeline-impact-on-global-warming/> accessed 18th January 2016

production. However environment minister Peter Kent argued that "the Kyoto protocol does not cover the world's largest two emitters, the United States and China, and therefore cannot work,"[121] defending their decision to leave the Kyoto Protocol and deflecting the blame away from the oil sands. Despite not ratifying Kyoto, the US have still maintained their commitment to reducing emissions in line with the protocol, opposing Peter Kent's argument.

The United States would most likely be supportive of this move given their support for Canadian oil.[122] However for this oil to actually reach these supporting faraway markets would require an expensive and risky pipeline which many environmentalists, and indeed Barack Obama himself, was opposed to.[123] He rejected the pipeline proposals stating as a global leader acting against climate change, approving the Keystone XL pipeline would undermine this.[124] This signifies the impact the pipeline could have on the climate change agenda, and that approving proposals to expand this industry would be undermining commitment to tackling climate change.

Yet despite being somewhat unable to transport the oil to faraway markets, the tar sands have still become a huge economic driver in Alberta, creating a huge number of jobs for local native people.[125] According to an employment survey conducted by Statistics Canada, approximately 133,053 people were employed in Alberta's upstream energy sector in 2014,[126] which includes

[121] The Guardian, 'Canada pulls out of Kyoto protocol', (The Guardian. UK. December 13, 2011) <https://www.theguardian.com/environment/2011/dec/13/canada-pulls-out-kyoto-protocol> accessed 7th January 2017

[122] George A. Gonzalez, 'American Empire and the Canadian Oil Sands', (Palgrave Macmillan, 1st Edn, 2016) pg 7

[123] Bobby Magill, 'Obama Rejects Keystone XL Pipeline', (Scientific American, November 2015) <http://www.scientificamerican.com/article/obama-rejects-keystone-xl-pipeline/> accessed 14th February 2015

[124] Ibid.

[125] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 17th January 2016

[126] Statistics Canada, Survey of Employment, Payrolls and Hours.

oil sands, conventional oil, gas and mining,[127] highlighting the vast array of jobs and the high level of employment created by this industry. These jobs have been filled by both newcomers to Alberta[128] and local's, with the population increasing by 37% to approximately 3.7 million people in the past decade.[129] Furthermore, there is an estimated 23,000 Aboriginal people living in Alberta's oil sands regions[130] that are benefiting from the various oil sands projects and high levels of employment. There were more than 1,700 Aboriginal employees in permanent oil sand related jobs in Alberta as of 2010,[131] suggesting the economic benefit is not just for the immigrants moving to the region but also to those that have had their traditional way of life taken away from them.[132]

Whilst these employment opportunities may appease some locals[133] this is not necessarily a benefit to all,[134] but nonetheless according to a report for the Indian Resource Council, many major oil sands companies have Aboriginal employment policies to recruit local residents and about 10% of the oil sands workforce is Aboriginal.[135] Yet this could be considered merely

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[127] Alberta Energy, 'Facts and Statistics' < http://www.energy.alberta.ca/oilsands/791.asp> accessed 17th January 2016

[128] Jeremy van Loon, 'Energy sector brings wealth, immigrants to Alberta', (Bloomberg News, December 2011) <http://oilsandstruth.org/energy-sector-brings-wealth-immigrants-alberta> accessed 18 January 2017

[129] Ibid

[130] Over 18 First Nations and six Métis Settlements located in the region. Thousands more live off-reserve and off-settlement. Source: ibid

[131] This figure does not include construction-related jobs. Source: <http://oilsands.alberta.ca/aboriginalpeople.html>

[132] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)

[133] Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 22nd May 2016

[134] Johnson, R 2011, 'Tunnel Vision', Earth Island Journal, 26, 1, pp. 43-48, Environment Complete, EBSCOhost, viewed 22 May 2016.

[135] First Nations Engagement in the Energy Sector in Western Canada, (Prepared for Indian Resource Council, June 2016) accessed 18th January 2016

tokenism, an attempted peace offering for potentially endangering the health of locals, and indeed breaching their treaty rights, but no legal resolution has been seen, even in the Supreme Court in both the *Haida*[136] and *Taku*[137] cases. These rulings, among others, have highlighted the vast array of breaches to treaty rights for aboriginal people, for example the Beaver Lake Cree have documented 20,000 treaty rights violations in the face of tar sands expansion,[138] yet the rulings in their favour have proved somewhat ineffective despite appearing to be supportive of their claims.

Despite this, from 1998 to 2010 Aboriginal-owned companies secured over $5 billion worth of contracts from oil sands companies in the region, providing an obvious economic benefit to the locals, and a clear incentive to not complain. Yet, supporters tend to exaggerate the economic benefits of the oil sands outside Alberta's borders, and it could therefore be unwise to depend on this industry for the nation's economic prosperity unless the method of extraction were made environmentally sustainable.[139]

However this could be a more viable source of energy if land remediation was consistently occurring, restoring the land to its previous state and in turn minimising the environmental impacts. The Environmental Protection Security Fund set aside $820 million for remediation of the land[140] and whilst this may seem a sufficient sum of money, and a proactive approach to

[136] Haida Nation v British Columbia (Ministry of Forests), 2004, Supreme Court of Canada 73.
[137] Taku River, Tlingit First Nation v British Columbia, 2004, Supreme Court of Canada 74.
[138] Climate 5 - Oil Sands Reality Check
[139] Shawn Mccarthy, Why the oil sands matter to every Canadian (The Globe and Mail, October 28th 2014) < http://www.theglobeandmail.com/report-on-business/rob-magazine/why-the-oil-sands-matter-to-every-canadian/article21331322/> accessed 13th January 2016
[140] Nathan Lemphers, Simon Dyer & Jennifer Grant, 'Toxic Liability: How Albertans Could End Up Paying For Oil Sands Mine Reclamation, (Oil Sands Fever Series, September 2010) < https://www.pembina.org/reports/toxic-liability-report.pdf> accessed 18th January 2016

foresee the potential costs of remediation, this actually works out at $12,000 per hectare. However, the Pembina Institute[141] estimate the cost of the reclaiming this disturbed land will be $10 billion to $15 billion (approximately $220,000 to $320,000 per hectare) and if the program remains underfunded, taxpayers might end of paying for clean-up costs, potentially exposing each Alberta taxpayer to a tax liability of $4,300 to $6,300.[142] This undermines the polluter pays principle of environmental law, which imposes the cost of pollution on the individual polluter or organisation, rather than on the public purse.[143]

1.5 Cons of Tar Sand Production

Whilst it is easy to see that there are many benefits to tar sand production, such as the economic boost and jobs created for local indigenous communities discussed above, it could be argued that the cons outweigh these. Indeed *Figure 5* would suggest the majority of the population in Canada would agree. The main argument against production of the oil sands lies in the enormous GHG emissions, as the oil sands themselves are Canada's largest source of CO_2 emissions[144] and the outdated extraction methods used in the Alberta oil sands[145] are among the most carbon-intensive.[146]

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[141] Ibid

[142] Ibid

[143] Marie-Louise Larsson, *'The Law of Environmental Damage: Liability and Reparation',* (Sweden: Norstedts Tryckeri, 1999) Pg. 90

[144] Environment and Climate Change Canada (2016) National Inventory Report 1990–2014: Greenhouse Gas Sources and Sinks in Canada.

[145] RAMP, 'History of the Oil Sands' (RAMP: Regional Aquatics Monitoring Program) <http://www.ramp-alberta.org/resources/development/mining.aspx> accessed: 12th January 2016; C. A. Poveda & M. G. Lipsett, 'Surface Mining Operations in Oil Sands: Establishing Sustainable Development Indicators (SDI's)', (WTI Press, 2014) pg 97

[146] Ashley Terry, 'Pros and cons: Alberta oil sands', (Global News, August 2009) < http://globalnews.ca/news/66591/pros-and-cons-alberta-oil-sands/> accessed 18th January 2017

When compared to the average crude oil processed in the United States, greenhouse gas emissions from the Alberta oil sands are approximately 5-15% higher because the oil is too deep to be extracted using traditional methods, and this provides a relatively low net energy return when compared with other sources. The average Energy Return on Investment (EROI) for the production of conventional oil and gas is approximately 18:1-10:1[147] compared with that of the oil sands which is currently around 5:1-4:1,[148] and nearer to 2:1 for deeper oil,[149] making the economic return lower than other sources of oil. As you can see from *Figure 3* below, the tar sands have one of the lowest EROI's, and with energy prices fluctuating this could be a risky investment for Canada. Yet wind power has a high EROI value, with the mean as high as 20:1-18:1[150] suggesting this could be a viable alternative for electricity, and certainly a more sustainable one. Of course this would not help with the vast quantities of oil needed by the transportation sector, but finding renewable alternatives to meet the electricity demand would certainly assist in bringing down national and provincial GHG emissions.

[147] Guilford et al., 'A new long term assessment of energy return on investment (EROI) for US oil and gas discovery and production', (Sustainability, 2011) 3 pg 1866–1887

[148] David Hughes, 'Drill, Baby, Drill: Can Unconventional Fuels Usher in a New Era of Energy Abundance?', (Post Carbon Institute, February 2013) < http://www.postcarbon.org/publications/drill-baby-drill/> accessed 18th January 2017; Lambert et al., 'EROI of Global Energy Resources: Preliminary Status and Trends', (Report 1 of 2. UK-DFID 59717, 2012)

[149] Ibid

[150] Kubiszewski et al., 2010; Lambert et al., 2012

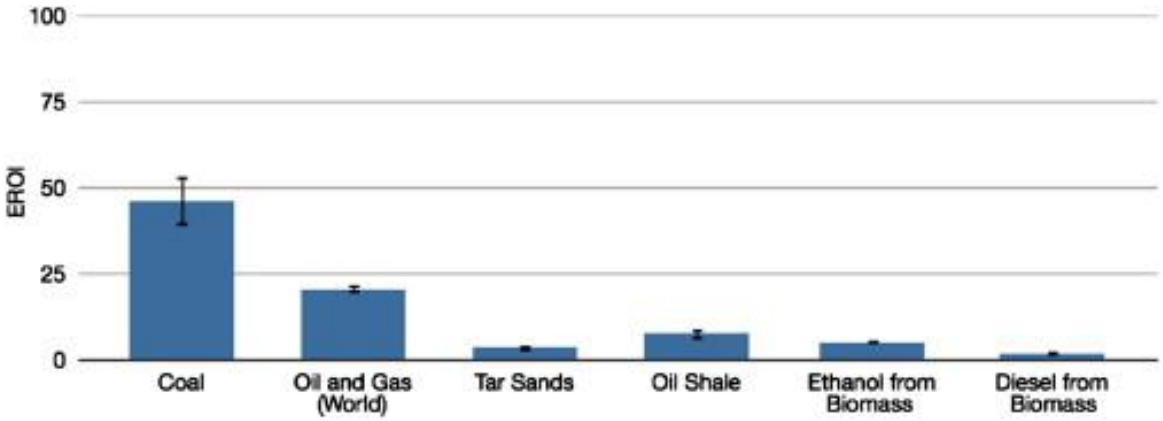

***Figure 3**. Mean EROI (and standard error bars) values for thermal fuels based on known published values*[151]

Environment Canada have reported that regional areas within the western Canadian boreal forest have increased by 2°C since 1948, suggesting that not only are the CO_2 emissions higher as a result of the tar sand production, but that it is actively 'warming' the air and aiding climate change.[152] Whilst there could be a number of contributing factors to this temperature increase, producing a barrel of synthetic crude oil from the oil sands releases up to three times more greenhouse gas pollution than conventional oil.[153] This is due to the vast amount of energy needed to heat the bitumen,[154] which could suggest that the influx in oil production in this region, and in turn the influx of emissions, could be directly contributing to the warming of the

[151] Mean EROI (and standard error bars) values for thermal fuels based on known published values. Values are derived using known modern and historical published EROI and energy analysis assessments and values published by Dale (2010). Source: Charles A.S. Hall, , Jessica G. Lambert, Stephen B. Balogh,*'EROI of different fuels and the implications for society'*, (Volume 64, January 2014) pg 141–152

[152] Environment Canada, Annual Regional Temperature Departures, (Environment Canada, 2nd April 2012)

[153] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 18th January 2017

[154] Ibid

forest.[155] However, the warming of the forest is creating more problems for GHG emissions. The warmth is leading to an increase in forest fires which again release more carbon emissions as well as destroying vast areas of this important carbon sink according to *The Nature Conservancy Canada*.[156]

Not only are more greenhouse gases being emitted, but 25% of the oil is unrecoverable, and the ratio needed to wash the oil out of the sands is 3 to 4 parts water to 1 part oil, creating a huge amount of waste water and roughly 3 million gallons of toxic runoff per day, which has created 50 square miles of land covered in toxic pools.[157] This has led to heavy contamination of the Athabasca River and the accidental deaths of wildlife and species.[158] Furthermore, the extraction process has released a variety of damaging hydrocarbons[159] and PAHs,[160] turning farmland into

[155] Hillary Rosner (writes for National Geographic, Wired and Scientific American), 'The Boreal Is Burning', (Take Part, November 2015) < http://www.takepart.com/feature/2015/11/30/destruction-canadas-boreal-forest> accessed 18 January 2016

[156] Ronnie Drever, forest ecologist for The Nature Conservancy Canada. Source: Ibid

[157] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 18th January 2016

[158] Barrios, P. and Putt, D. Investor briefing note: 'What investors need to know about reclamation risks in the Oil Sands', (Vancouver: Shareholder Association for Research and Education: SHARE. 2010) <http://www.share.ca> accessed 6th March 2017

[159] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[160] D.W. Schindler, W.F. Donahue and John P. Thompson, Running out of Steam? Oil Sands Development and Water Use in the Athabasca River-Watershed: Science and Market based Solutions, (University of Alberta, May 2007) pg 10; Canadian Council of Ministers of the Environment 1999; Evans, M.S. Billeck, S.B. Lockhart, L. Bechtold, J.P. Yunker, M.B. & Stern, G. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, 2002; Headley, J.V., C. Akre, F.M. Conly, K.M. Peru and L.C. Dickson. 2001. Preliminary characterization and source assessment of PAHs in tributary sediments of the Athabasca River, Canada. Environmental Forensics. 2: 335-345; Evans M S., B. Billeck, L. Lockhart, J.P. Bechtold, M.B. Yunker and G. Stern. 2002. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, Southampton UK.

wasteland.[161] The boreal forest started out a crucial carbon sink, possessing the ability to naturally absorb CO_2 from the atmosphere, now this area is the highest producer of CO_2 emissions in Canada.

However the destruction goes beyond polluted water, loss of farmland and destruction of the forest, as a result of the widespread destruction, animal habitats on land and in water have been destroyed; the Athabasca Delta, which is usually a breeding ground for many species of wildlife, has been flattened to make way for the oil sand production. Furthermore, 110 dead birds were recovered from Canadian Natural Resources Horizon mine tailings pond,[162] over 400 were sighted on the oil-covered pond and many more may have died later due to exposure to the toxic substances. Aquatic life has also been put at risk in the region and indeed a number of studies have found deformities and diseases among fish populations, as well as degradation of aquatic ecosystems.[163] However, there is conflicting research in this area and RAMP disagree with Environment Canada, with their studies showing that deformity rates are normal compared to historical data; perhaps because RAMP is funded largely by those energy companies with

[161] Greenpeace, 'Tar Sands and Boreal Forest', (*Greenpeace*, date unknown) <http://www.greenpeace.org/canada/Global/canada/report/2010/4/BorealForest_FS_Footnote_rev_4.pdf> accessed 21 January 2017

[162] 94 during the initial incident on November 4th and 5th, and 16 more over the next two days Source: Keith Stewart, 'Greenpeace calls for full investigation after releasing FOI documents on bird deaths in CNRL tailings pond' (Greenpeace, May 2015) <http://www.greenpeace.org/canada/en/blog/Blogentry/greenpeace-releases-new-evidence-and-calls-fo/blog/52775/> accessed 13th February 2016

[163] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

direct interests in the relevant environments.[164] The effects specifically on wildlife and the wider environment, including indigenous rights, will be discussed and analysed later on in Chapter Three.

Whilst the above mentioned environmental issues are a serious concern,[165] the main issue stems back to the unsustainability of industry.[166] Marketed to the public as a sustainable alternative,[167] this limited resource is actually far from sustainable, undermining the international principle of sustainable development by leaving a negative carbon footprint for future generations to clean-up, potentially leaving them responsible for funding this as well,[168] and fundamentally ignoring the environmental pillar and future generations as outlined in the Brundtland definition of SD.[169] It is argued that Alberta has achieved this through 'a process of discursive reframing' rather than restructuring their internal processes in order to be compliant with the principle of SD.[170] In

[164] Oil Sands- Bituminous Deposits ah Tar Sand, (March 2014) < http://globebackyard.blogspot.co.uk/2014/03/oil-sands-bituminous-deposits-ah-tar.html>

[165] Charles A.S. Hall, , Jessica G. Lambert, Stephen B. Balogh,*'EROI of different fuels and the implications for society'*, (Volume 64, January 2014) pg 141–152; Environment Canada, Annual Regional Temperature Departures, (Environment Canada, 2nd April 2012); Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 18th January 2017; Keith Stewart, 'Greenpeace calls for full investigation after releasing FOI documents on bird deaths in CNRL tailings pond' (Greenpeace, May 2015) <http://www.greenpeace.org/canada/en/blog/Blogentry/greenpeace-releases-new-evidence-and-calls-fo/blog/52775/> accessed 13th February 2016

[166] Toban Black, Stephen D'Arcy & Tony Weis, 'A Line in the Tar Sands: Struggles for Environmental Justice', (Between the Lines, 1st Edn, 2014) pg 49

[167] Alberta Energy market the oil sands as a stable and reliable energy to the world, Canada's greatest buried energy treasure. Source: Alberta Energy, 'What is Oil Sands?', < http://www.energy.alberta.ca/OilSands/793.asp> accessed 18 January 2017; Toban Black, Stephen D'Arcy & Tony Weis, 'A Line in the Tar Sands: Struggles for Environmental Justice', (Between the Lines, 1st Edn, 2014) pg 49

[168] Nathan Lemphers, Simon Dyer & Jennifer Grant, 'Toxic Liability: How Albertans Could End Up Paying For Oil Sands Mine Reclamation, (Oil Sands Fever Series, September 2010) < https://www.pembina.org/reports/toxic-liability-report.pdf> accessed 18th January 2016

[169] United Nations, (1987) Our Common Future - Brundtland Report.

[170] Davidson, D. and Mackendrick, N. 'All Dressed Up with Nowhere to Go: The Discourse of Ecological Modernization in Alberta, Canada.' (Canadian Review of Sociology and Anthropology, 2003) 41 (1)

other words Alberta is simply reinterpreting the concept of SD and the words used as opposed to adapting their behaviour.[171]

1.6 Summary

The tar sands oil have a cost/benefit profile that is similar in many ways to coal, except that coal is used for electricity while oil is used for transportation. The similarities between tar sand oil and coal are the large supply on the one hand and the massive environmental problems on the other, but as bad as the environmental impacts of coal are, the tar sands might be even worse.[172] The tar sands require the running of large machines, heating and wasting huge quantities of water, pumping bitumen and creating an increase in petroleum coke by-products,[173] making the tar sands worse than coal in terms of relative CO_2 emissions.[174]

At present there are more sustainable alternatives for electricity than there are for transportation and oil[175] and until the day comes where the transportation industry can rely on renewable energy, the oil sands industry should remain secure. However this could change if gases like natural gas, which have a less harmful effect on the environment,[176] could be used as a bridge fuel until a time when wind, solar and other renewable energy can be used to replace fossil carbon based fuels entirely.[177] As a high-cost and carbon-intensive fossil fuel source,

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[171] Toban Black, Stephen D'Arcy & Tony Weis, 'A Line in the Tar Sands: Struggles for Environmental Justice', (Between the Lines, 1st Edn, 2014) pg 50
[172] Ibid, pg 15
[173] Toban Black, Stephen D'Arcy, Tony Weis, Joshua Kahn Russell, '*A Line in the Tar Sands: Struggles for Environmental Justice'* (Between the Lines: Ontario, 1st Edn) pg 15
[174] Ibid.
[175] Robert L. Evans, 'Fueling Our Future: An Introduction to Sustainable Energy', (Cambridge University Press, 1st Edn, 2007) pg 168
[176] EIA, 'Natural Gas Explained', (US Energy Information Administration, 2016) <http://www.eia.gov/energyexplained/?page=natural_gas_environment> accessed 30th January 2017
[177] Donald M. Kinzer*, 'Politics, Economics and Investments: Don's Thoughts'* (AuthorHouse, 2014) pg. 54

Canada's oil sands are at risk of being among the first to go if global oil demand and prices begin to fall[178] and if alternative and cheaper sources of oil are discovered to be more cost effective and sustainable.

Indeed 97% of the world's climate scientists agree that climate change is happening, and it's happening because of human activity.[179] Such activity could be attributed to large scale developments such as the oil sands, yet whilst the Canadian government and the tar sands industry say that tar sands expansion is inevitable, with Obama rejecting the Keystone XL Pipeline, and many attitudes changing around the world, it seems the oil sands no longer make economic sense.[180] Of course Trump is now looking to undermine the rejection of the pipeline, as is he also looking to develop fracking to enable the US to have energy independence, highlighting the instability of the oil sands with regard to their biggest buyer. Despite current demand, if a more sustainable and cost-effective alternative were to compete with the oil sands it would undoubtedly re-shape the position of this industry.

Expansion of the tar sands simply cannot continue in a world where governments are taking stronger action to address climate change. The United States is on track to cut its global warming emissions by as much as 21% by 2020,[181] upholding their commitment to the Kyoto Protocol

[178] Environmental Defence, 'Far from Inevitable: The Risks of and Barriers to Tar Sands Expansion', (December 2014) < http://www.climateaccess.org/sites/default/files/ED%20NRDC_Far%20From%20Inevitable.pdf> accessed 30th January 2016

[179] NASA. (2014). Consensus: 97% of climate scientists agree. http://climate.nasa.gov/scientificconsensus/ accessed 21st January 2016

[180] Jeff Rubin, 'Why the oil sands no longer make economic sense', (The Globe and Mail, November 2015) < http://www.theglobeandmail.com/report-on-business/rob-commentary/oil-sands-no-longer-make-economic-sense/article27170104/> accessed 30th January 2016

[181] U.S. Department of State, United States Climate Action Report 2014, First Biennial Report of the United States of America, Sixth National Communication of the United States of America, January 1, 2014, p. 18.

despite never ratifying it,[182] and China has agreed to cap their emissions as well,[183] demonstrating that some of the largest and most powerful countries understand the very real and urgent consequences of climate change. With the EROI of oil sands one of the lowest,[184] creating an extremely costly means of energy,[185] it is hard to justify exploitation and economic dependence on an oil that is no longer profitable.[186]

Canadians deserve an informed insight into the future of their economy; blessed with an abundance of energy resources, how these are managed environmentally and economically has ramifications that will affect current and future generations and these should be publicly known.[187] One of the main pillars of environmental law is that the public should participate in decision making in relation to the environment,[188] these decisions will inevitably affect their lives. Therefore, the public in Canada should have access to information regarding the longevity of the oil sand developments, and the sustainability of them. That being said, whilst Canada signed the Aarhus Convention which gives signatories the legal right to Access to Information,

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[182] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997

[183] White House. (2014). FACT SHEET: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation. Retrieved from: http://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-jointannouncement-climate-change-and-clean-energy-c

[184] David Hughes, 'Drill, Baby, Drill: Can Unconventional Fuels Usher in a New Era of Energy Abundance?', (Post Carbon Institute, February 2013) < http://www.postcarbon.org/publications/drill-baby-drill/> accessed 18th January 2017; Lambert et al., 2012

[185] International Energy Agency. (no date). Resources to Reserves – Executive Summary. Retrieved from http://www.iea.org/textbase/npsum/oil_gasSUM.pdf , p. 17.

[186] Sarah Kent, 'Energy Companies Face Crude Reality: Better to Leave It in the Ground', (Morning Star, 2017) < http://news.morningstar.com/all/dow-jones/us-markets/201702172655/energy-companies-face-crude-reality-better-to-leave-it-in-the-ground.aspx> accessed 7th March 2017

[187] Pembina Institute, <http://www.equiterre.org/sites/fichiers/booms_busts_and_bitumen_-_the_economic_implications_of_canadian_oilsands_development.pdf> accessed 13th February 2016

[188] Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)

Public Participation in Decision-making and Access to Justice in Environmental Matters,[189] they have not yet ratified this convention therefore it is not in force in Canada; thus, providing public participation as a legal right is not currently a requirement. The notion of public participation will be discussed later in Chapter Three but this research will now look in further detail at the environmental consequences and the relevant legislation surrounding sustainability and climate change, in order to assess the legality of the tar sands.

[189] Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)

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Chapter Two

Environmental Challenges

2.1 Introduction

The modern world is increasingly more dependent on hydrocarbons, including both oil and gas.[190] With conventional oil reserves dwindling the allure of unconventional sources of energy, like the oil sands, continues to grow despite the negative consequences,[191] thus making it imperative to explore these challenges to establish the legal position and the potential dangers of a growing oil sands industry. The regulatory framework for managing such extraction and production must reflect that inevitably extraction will continue to grow for the foreseeable future, which some argue is essential due to global dependence on hydrocarbons.[192]

However, like many of the environmental challenges facing the Albertan oil sands, air pollution is one challenge that is not being managed well enough to protect our communities, our environment and our health,[193] calling for reform of this industry.[194] With air pollution, both

[190] For the first time since 1999, the proportion of global energy obtained from oil increased in 2015. Source: Spencer Dale, BP Global, 'Energy in 2015: A year of plenty', (BP, June 2015) <http://www.bp.com/en/global/corporate/press/speeches/energy-in-2015-a-year-of-plenty.html> accessed 7th March 2017

[191] A. R. Brandt and A. E. Farrell, "Scraping the Botton of the Barrel: Greenhouse Gas Emission Consequences of a Transition to Low-Quality and Synthetic Petroleum Resources" (2007) 84 Climate Change 3.

[192] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 4

[193]Environmental Defence Canada, 'REALITY CHECK: Air Pollution and the Tar Sands' (2013) < file:///D:/Users/Student/Downloads/AirandTarSandsReport_FINAL.pdf> acceded 20th February 2016;

[194] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012); Palen, W. et al, 'Oil Sands Moratorium', (Oil Sands Moratorium, 2016) <http://www.oilsandsmoratorium.org/scientists/> accessed 30th January 2017

provincial and transboundary, rapidly increasing,[195] it is important to ascertain the impact this could have, and is having, on the surrounding environment. The emissions into this nearly pristine area have been of concern since development began,[196] but what implications are they having, and what is the legality of this?

2.2 Resource Usage

One of the major concerns surrounding the oil sands industry is the vast amount of resources used during the process from start to finish.[197] It is imperative to balance the use of one resource with the production of another. However in the case of Alberta, it seems the scales have been tipped to favour the oil sands. The production is intensive, using a huge amount of water and heat to extract the oil from the sand.[198, 199] It is therefore a growing concern that the Athabasca River is going to have insufficient water to meet the demand.[200] Furthermore, usage of natural

[195] Dan Woynillowicz, 'How Canada Went from 21st to 2nd in World's Oil Reserves', (World Watch, September 2007) <http://www.alternet.org/story/62325/how_canada_went_from_21st_to_2nd_in_world's_oil_reserves> accessed 20th February 2016

[196] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[197] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6; Holowenko FM, MacKinnon MD, Fedorak PM (2002) Characterization of naphthenic acids in oil sands wastewaters by gas chromatography-mass spectrometry. Water Res 36:2843–2855; Down to the Last Drop: The Athabasca River and the Oil Sands, Pembina Institute, March 2006, p.ii; Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 12

[198] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6; Holowenko FM, MacKinnon MD, Fedorak PM (2002) Characterization of naphthenic acids in oil sands wastewaters by gas chromatography-mass spectrometry. Water Res 36:2843–2855; Down to the Last Drop: The Athabasca River and the Oil Sands, Pembina Institute, March 2006, p.ii

[199] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 18th January 2017

[200] Investing In Our Future: Responding to the Rapid Growth of Oil Sands Development, Doug Radke, December 29,2006, p.112, p.133.

gas in the production process[201] seems somewhat counter-productive. Why is a more energy efficient and less polluting source of energy being depleted to create a more harmful one? The use of fundamental resources needs to be discussed in order to understand the wider risks when producing this oil.

2.2.1 Water Usage

Resource consumption concerns centre on water usage.[202] Vast amounts of water is used to extract the raw material from the tar sand deposits; a ratio of approximately four barrels of water for every barrel of oil produced is required,[203] which critics have labelled a perplexing and ridiculous amount.[204] The level of water consumption is, and should be accepted as capable of being reduced, hence certain companies investing heavily into researching methods of doing so, whether through recycling or the use of alternatives. However, these actions often actively go beyond government regulations imposed upon them.[205] The oil sands licensing system in Alberta has been designed to reduce consumption and imposes strict regulations to do so.[206] The high costs and licensing are in place to act as a deterrent and firms are incentivised into reducing environmentally damaging water consumption through a regulatory system which promotes the

[201] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 12
[202] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6
[203] Holowenko FM, MacKinnon MD, Fedorak PM (2002) Characterization of naphthenic acids in oil sands wastewaters by gas chromatography-mass spectrometry. Water Res 36:2843–2855
[204] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6
[205] Ibid
[206] Alberta Water Act RSA 2000 Chapter W-3 (CAN)

notion of 'consuming responsibly', thus promoting good environmental practice and education.[207]

The regulations require periodic reporting of the extraction of water, especially in relation to that removed from natural sources like the Athabasca River.[208] This type of compulsory monitoring claims to be in line with the polluter pays principle of environmental law,[209] but if this is indeed the case, and regulations are so strict, then why is it unclear how much water is actually used in this industry?[210] Furthermore, whilst compulsory self-reporting may safeguard the resources by acting as a deterrent, and consequently adhering to the polluter pays principle, this undermines the ideals behind the precautionary principle of environmental law; traditionally this would result in halting further development of a resource in the face of reasonably anticipated or likely environmental harm.[211] Yet development is set for major expansion despite environmental consequences being more than likely.

2.2.2 The Athabasca River

As discussed, one of the principle environmental concerns is water usage from the Athabasca River,[212] which flows nearly 1,500 kilometres from its source at the Athabasca Glacier in Jasper

[207] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6
[208] The Government of Alberta, 'Compulsory Industry Monitoring' (November 2015) <http://aep.alberta.ca/about-us/compliance-assurance-program/documents/CompulsoryIndustryMonitoring-Nov30-2015.pdf> accessed 15th May 2016
[209] Ibid
[210] Canadian Association of Petroleum Producers. <http://www.capp.ca/getdoc.aspx?Docid=193756>; Syncrude Canada Limited 2005
[211] P. L. de Fur and M. Kaszuba, "Implementing the Precautionary Principle" 288 Science of the Total Environment 155, 157.
[212] Eril, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 125

National Park to Lake Athabasca in Wood Buffalo National Park. This passes directly through the boreal forest that is being cleared and strip-mined, and serves as the primary source of water used to separate the bitumen from the mined tar sands.[213] Water withdrawals for the oil sand mining operations pose threats to the sustainability of fish populations in the Athabasca River[214] and the sustainability of the Peace-Athabasca Delta, jeopardizing local Aboriginal fisheries.

Where the delta of the Athabasca River joins the Peace and Birch rivers, there is a large series of wetlands and lakes known as the Peace-Athabasca Delta. At 6000 km^2, this is one of the world's largest freshwater deltas and the largest boreal delta, containing over 1000 lakes which are flooded periodically during spring ice jams of the rivers.[215] The delta supports large communities of aboriginal people and is an important staging area for migratory waterfowl. Up to 400,000 birds use the Delta in spring and more than 1 million use it in autumn and it is the prime range for 5000 bison.[216] The Delta is still largely undisturbed by humans, and has been recognized internationally as a designated RAMSAR wetland site and a UNESCO World Heritage Site.[217]

As Canada's oil sand reserves represent 60% of the world's investable oil reserves[218] an important balance must be struck. In order to produce 1 million barrels of oil a day, the industry

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[213] Ibid
[214] Ibid
[215] D.W. Schindler, W.F. Donahue and John P. Thompson, Running out of Steam? Oil Sands Development and Water Use in the Athabasca River-Watershed: Science and Market based Solutions, (University of Alberta, May 2007) pg 10.
[216] Ibid
[217] Ibid; From a presentation by the Pembina Institute to a parliamentary committee available at: <http://www2.parl.gc.ca/HousePublications/Publication.aspx?DocId=3908218&Language=E&Mode=1&Parl=40&Ses=2> accessed 21 January 2017
[218] CIBC World Markets Annual Report, 'Innovation and Accountability', (*CIBC*, December 2000) <https://www.cibc.com/ca/pdf/investor/00-anl-rpt.pdf> accessed 30th January 2017, pg 1

requires enough water from the Athabasca River to sustain a city of two million people every year,[219] which could be 'reasonably anticipated' as per the precautionary principle, to cause habitat degradation, and indeed is causing this to aquatic life,[220] and a water shortage to local communities. As of 2016, the industry was producing on average 2.5 million barrels per day,[221] which according to the projection, would produce more than enough water to sustain a city of two million people for two years. Reviewing this in accordance with the precautionary principle would see expansion halted due to realistic concerns over local health and ecosystem loss.

However, the exact amount of water used remains unclear. Estimates of the volume of water consumed to facilitate processing the bituminous oil sands range from 1-3 barrels of water to each barrel of synthetic crude oil produced.[222, 223] Moreover, some argue that it is as much as 4 barrels of water per barrel of oil produced,[224] leaving it unclear if the allocated <2% of river water will be able to support the estimated triple expansion in exploitation of oil sands over the next decade,[225] especially with low winter flows.[226] If water use is as many as 4 barrels per barrel of oil produced, the situation for the Athabasca River will worsen, losing more habitats and wildlife and worsening the water situation for local aboriginals.

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[219] Down to the Last Drop: The Athabasca River and the Oil Sands, Pembina Institute, March 2006, p.ii.
[220] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016
[221] National Energy Board, 'Market Snapshot: Oil Sands Production to Increase, but Effects of Low Oil Prices are Evident', (NEB, 2016) <https://www.neb-one.gc.ca/nrg/ntgrtd/mrkt/snpsht/2015/12-03lsndsprdctn-eng.html?=undefined&wbdisable=true> accessed 12th March 2017
[222] Canadian Association of Petroleum Producers. <http://www.capp.ca/getdoc.aspx?Docid=193756>
[223] Syncrude Canada Limited 2005
[224] Holowenko FM, MacKinnon MD, Fedorak PM (2002) Characterization of naphthenic acids in oil sands wastewaters by gas chromatography-mass spectrometry. Water Res 36:2843–2855
[225] National Energy Board, 'Regulatory Agenda' (*National Energy Board*, January 2006) <http://publications.gc.ca/collections/Collection/NE12-4-2006-1E.pdf> accessed 19th November 2016
[226] Peachey, B. Strategic needs for energy related water use technologies. Water and the EnergyINet Report prepared for the Alberta Energy Research Institute, Calgary. 2005

Historically, it was believed that the Athabasca River had sufficient water to meet the needs of tar sands operations,[227] but growing demand for water withdrawals for oil sands production could lead to long-term ecological impacts, leaving the Athabasca River unable to meet the needs of all the planned mining operations and maintain adequate stream flows.[228] Indeed, if the usage were to impact the aquatic ecosystem, Alberta Environment are entitled to limit the withdrawals to 10% of the rivers natural flow as a safeguard.[229] However, a report, *Investing In Our Future*, noted that "over the long term the Athabasca River may not have sufficient flows to meet the needs of all the planned mining operations and maintain adequate stream flows", concluding that Alberta Environment had failed "to provide timely advice and direction" on water use,[230] failing their purpose to act as a safeguard. Furthermore, the government has failed to implement sufficient regulations to stop withdrawal from the River when the health of the river is at risk. In fact the government allows the industry to continue withdrawing water no matter how low the river flows become, affecting the resources provided to the local communities, and implicating the sustainability of fish populations and aquatic life due to insufficient water levels.[231] Currently the oil sands account for approximately 72% of the water usage from the river.[232] With production set to increase so will this figure, leaving little or no

[227] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 20th January 2017
[228] Investing In Our Future: Responding to the Rapid Growth of Oil Sands Development, Doug Radke, December 29,2006, p.112 and p.133.
[229] Alberta Environment, Draft Interim Framework, Edmonton 2006.
[230] Investing In Our Future: Responding to the Rapid Growth of Oil Sands Development, Doug Radke, December 29,2006, p.112, p.133.
[231] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016
[232] Emily Chung, 'Oilsands may face severe water shortages, Athabasca River study suggests', (CBC News, 2015) <http://www.cbc.ca/news/technology/oilsands-water-use-1.3237239> accessed 21 January 2017

supply for aquatic life, ecosystems and First Nations, highlighting the lack of sustainability. What can be used when there is insufficient water, both by the industry itself and by the First Nations?

2.2.3 Natural Gas

Further, the oil sands are a major consumer of natural gas, representing around 20% of total Canadian demand. The oil sands extraction process utilizes enough natural gas to heat approximately 3.5 million Canadian homes.[233] Indeed it uses three times more units of energy to extract bitumen from oil sands than oil from conventional wells,[234] making this a highly energy intensive process. The current rate of natural gas consumption in the oil sands industry could use up to 60% of the nation's natural gas supplies by 2030.[235] As natural gas produces 30% less CO_2 emissions per unit than crude oil,[236] best practice from an energy efficiency, environmental protection and sustainability perspective would be to directly utilise the natural gas.

2.3 Air Pollution and Gas Emissions

[233] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 12
[234] Lorenzo Rosa et al, 'Environmental consequences of oil production from oil sands'. (2016)
[235] Natural Resources Canada, Roadmap Workshop on Non-petroleum-based Fuels and Advanced Combustion Research, Ecotourism and Sustainable Tourism Conference (ESTC), Portland, Oregon, November, 2007, as reported in Dirty Oil – How the Tar Sands are Fueling the Global Climate Crisis, Greenpeace, September 2009, p.22; Dan Woynillowicz, Pembina Institute, Oil Sands Fever – The Environmental Implications of Canada's Oil Sand Rush, 2005, p.24; There were 12,437,500 households reported in the 2006 Canadian Census. Human Resources and Skills Development Canada, Canadians in Context – Households and Families, <http://www4.hrsdc.gc.ca/.3ndic.1t.4r@-eng.jsp?iid=37> accessed 17 April 2016
[236] NaturalGas.org, Natural Gas and the Environment, http://www.naturalgas.org/environment/naturalgas.asp; Natural Resources Canada, Chapter 5: The Challenges, <http://cmte.parl.gc.ca/Content/HOC/committee/391/rnnr/reports/rp2614277/rnnrrp04/10_Chap_5_ENG.htm> accessed 17th April 2016

Resource usage is not the only concern for the environment. The burning of any fuel will result in emissions, as will the use of pipelines and refineries to produce the end product, and most steps along the production journey. But where should the line be drawn?

According to the *Canadian Environmental Protection Act, 1999*,[237] air pollution is defined as:

> *"A condition of the air, arising wholly or partly from the presence in the air of any substance, that directly or indirectly:*
>
> *(a) endangers the health, safety or welfare of humans;*
>
> *(b) interferes with the normal enjoyment of life or property;*
>
> *(c) endangers the health of animal life;*
>
> *(d) causes damage to plant life or to property; or*
>
> *(e) degrades or alters, or forms part of a process of degradation or alteration of, an ecosystem to an extent that is detrimental to its use by humans, animals or plants."*

With such legislation in place in Canada, highlighting the acceptable standard of air quality, anything negatively impacting this standard is a major worry for the government, developers, local communities, and other stakeholders,[238] not to mention wholly incompatible with the legislation itself. Consequently, air quality will always be of concern for any major human developments because they will usually emit polluting substances, and in turn play a part in

[237] Canadian Environmental Protection Act, 1999, Section 3
[238] C. A. Poveda & M. G. Lipsett, 'The Canadian oil sands: environmental, economic, social, health, and other impacts' (Sustainable Development and Planning VI) 581

degrading ambient air quality. Indeed, more than 1,400 known pollutants are emitted by oil sands operations, but only a few are monitored.[239]

Since 2003, Alberta has been labelled "the industrial air pollution capital of Canada",[240] suggesting that since production of oil from the tar sands has begun, the air pollution from Alberta has worsened. Indeed, whilst emissions per barrel have reduced since production began, due to the vast increase in production the emissions have increased by 121% between 1990 and 2008,[241] and are predicted to expand further to 730% by 2020.[242]

Further, Criteria Air Contaminants (CACs) are also being emitted in large volumes. These CACs are defined as "air pollutants that affect our health and contribute to air pollution problems" and include such things as Nitrogen Oxides (NO_x) and Sulphur Oxides (SO_x), volatile organic compounds and particulate matter. So even though the Canadian oil sands projects have reduced their carbon dioxide emissions intensity by up to 33% since 1990, their contribution to the Canadian greenhouse gas emissions (GHGs) account for 6.5% of the nation's total, and less than 0.1% to the world's total GHG emissions. Additionally, the GHG emissions per barrel have been reduced between 1990 and 2009 by an average of 29%; however, emissions of SO_x and other sulphur compounds, NO_x, and total hydrocarbons, have been rising for the past decade

[239] Ibid
[240] G. Tyler Miller, Scott Spoolman, *Living in the Environment: Principles, Connections, and Solutions*, (Brooks/Cole 2009) pg 379
[241] Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf.
[242] Ibid

due to the growing increments in production.[243] So what effects could these rising emissions have on their surroundings?

2.3.1 Effects of Extraction

Since the oil sands contain around 5% bitumen and 0.5% nitrogen, the upgrading process can release large quantities of these as NO_2 and SO_2 forming sulphate aerosols at up to 6% per hour,[244] as well as producing soot.[245]

Nitrogen oxides (NO_x) and Sulphur oxides (SO_x) are a family of acidic gases particularly associated with negative effects on environmental and human health. SO_2 is the most common SO_x and the most heavily monitored and controlled; it is a colourless gas arising from a combustion of materials containing sulphur, typically fossil fuels.[246] These pollutants can acidify water and are respiratory irritants, causing a variety of adverse effects on human health.[247] These oxides can cause a number of serious health effects and are key to forming ozone and photochemical oxidants. Breathing low levels of ozone can trigger asthma attacks and other problems for people with pre-existing respiratory problems and can cause or worsen respiratory disease such as emphysema and bronchitis, and can aggravate existing heart disease.[248]

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[243] Gosselin, P., Hrudey. S. E., Naeth, M. A., Plourde, A., Therrien, R., Van Der Kraak, G., and Xu, Z. (2010). The Royal Society of Canada Expert Panel: Environmental and Health Impact of Canada's Oil Sands Industry. The Royal Society of Canada.

[244] Cheng et al. The Rate of SO_2 to Sulfate Particle Formation in an Air Parcel from an Oil Sands Extraction Plant Plume, (1987) 37. 163-167

[245] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[246] Dr Pierre Gosselin et al, 'The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry', (December 2010) pg. 95

[247] Ibid.

[248] Stockholm Environment Institute(SEI) 2012

Surely these potential risks could be considered to endanger health[249] in the surrounding communities? Indeed the proposed model of approved developments, which includes three operating mines and three operations at various stages of planning and construction,[250] demonstrates the maximum predicted ambient air concentrations of NO_X and SO_2 would exceed provincial, national, and international guidelines.[251] Whilst this could be a risk, levels of NO_x and SO_2 remained below the average as from 2001-2008, SO_2 annual emissions stood at 2.1-3.2 $\mu g/m^3$ with 30 $\mu g/m^3$ the annual average and NO_x emissions annually stood at 17.1-19.5 $\mu g/m^3$ with 60 $\mu g/m^3$ the annual average as seen in Table 1.[252]

Pollutant	Averaging Time	Guideline Level
SO_2	Annual	30 $\mu g/m^3$
	1 Hour	150 $\mu g/m^3$
	24 Hour	450 $\mu g/m^3$
NO_2	Annual	60 $\mu g/m^3$
	1 Hour	200 $\mu g/m^3$
	24 Hour	400 $\mu g/m^3$

[249] Canadian Environmental Protection Act, 1999, Section 3(1)(a)
[250] Danielle Droitsch, Steven A. Kennett & Dan Woynillowicz, 'Curing Environmental Dis-Integration A Prescription for Integrating the Government of Alberta's Strategic Initiatives;, (The Pembina Institute, April 2008) pg 6
[251] Dan Woynillowicz, 'How Canada Went from 21st to 2nd in World's Oil Reserves' (World Watch, September 2007) <http://www.alternet.org/story/62325/how_canada_went_from_21st_to_2nd_in_world's_oil_reserves> accessed 13th March 2016
[252] CASA 2010

Table 1. *Alberta's Ambient Air Quality Guidelines for SO2 and NO2*[253]

Whilst emissions for NO_x and SO_2 have remained at a safe level, below the annual average, they could still have major impacts on surrounding ecosystems. That being said, experimental evidence suggests that moderate concentrations of NO_x may produce positive growth responses to ecosystems.[254] However, when combined with SO_2, this can create negative effects on terrestrial and aquatic ecosystems,[255] potentially undermining Section 3(1)(d) and (e) of CEPA[256] if indeed produced in excess.

Alberta Environment measures the cleanliness of outdoor air, also known as ambient air, through the Air Quality Index (AQI), which includes the measurement of concentration of five major air pollutants including those above mentioned and the Royal Society of Canada (RSC) concluded that there has been minimal impact from the oil sands, except for noxious odour emissions, over the past two years.[257]

Yet, during the Artic Research of the Composition of the Troposphere from Aircraft and Satellites campaign (ARCTAS), in which two NASA research aircraft's spent about half an hour sampling air around the oil sands mining and upgrading facilities near Fort McMurray, the gas-phase data revealed two different types of plumes.[258] One plume consisted mainly of light hydrocarbons,

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[253] *Canadian Environmental Protection Act 1999*
[254] Air Pollution Information System, (APIS, February 2016)
<http://www.apis.ac.uk/overview/pollutants/overview_NOx.htm> accessed 20th February 2016
[255] Environmental Protection Agency, 'AIRTrends 1995 Summary', (EPA, 2015)
http://www3.epa.gov/airtrends/aqtrnd95/no2.html accessed 20th February 2016
[256] Canadian Environmental Protection Act, 1999, Section 3(1)(d) and (e)
[257] Gosselin, P., Hrudey. S. E., Naeth, M. A., Plourde, A., Therrien, R., Van Der Kraak, G., and Xu, Z. (2010). The Royal Society of Canada Expert Panel: Environmental and Health Impact of Canada's Oil Sands Industry. The Royal Society of Canada.
[258] Simpson, I. J., Blake, N. J., Barletta, B., Diskin, G. S., Fuelberg, H. E., Gorham, K., Huey, L. G., Meinardi, S., Rowland, F. S., Vay, S. A., Weinheimer, A. J., Yang, M., and Blake, D. R.: Characterization of trace gases measured

presumed to be from the bitumen or the solvents used to mobilise it, the other was more industrial, with high concentrations of NO_2, SO_2, and CO_2. While it is accepted the data from just two flight samples does not produce a wide enough pool of results to provide definitive conclusions,[259] the unique location of the oil sands does help to provide a 'relatively clean background'[260] to which the results can be compared and seen on global satellite maps, without large populations and other industrial facilities masking the results.[261] Nevertheless, whilst the study found that aerosol emissions from the oil sands were small compared with annual forest fires, the research suggested that oil sand exploitation does contribute significant sulphate emissions and exceed fire production of SO_2. [262]

2.3.2 Summary

Whilst it has not been shown that SO_2 and NO_2 emissions are in breach of Ambient Air Quality Guidelines, research does suggest that emissions are significant enough to cause concern.[263] Emissions resulting from the oil sands are not adequately regulated and the impacts of air pollution on the surrounding ecosystems and people are not well understood.[264] However as

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over Alberta oil sands mining operations: 76 speciated C2–C10 volatile organic compounds (VOCs), CO2, CH4, CO, NO, NO2, NOy, O3 and SO2, Atmos. Chem. Phys., 10, 11931-11954, doi:10.5194/acp-10-11931-2010, 201

[259] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[260] McLinden et al, Air quality over the Canadian oil sands: A first assessment using satellite observations. (AGU Journal. 2012) 39 (4)

[261] Ibid.

[262] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[263] Ibid.

[264] Environmental Defence Canada, 'REALITY CHECK: Air Pollution and the Tar Sands' (2013) <file:///D:/Users/Student/Downloads/AirandTarSandsReport_FINAL.pdf> acceded 20th February 2016; Andrea Olive, 'The Canadian Environment in Political Context' (University of Toronto Press, 2016) pg 137-138

there is no clear contributor for emissions in the oil sands industry and with many different contributing factors, it is hard to regulate.[265] Yet the consequences of the emissions, whilst not deemed 'illegal' under current guidelines, are undeniable. On May 1st 2016, a wildfire broke out in the Fort McMurray region. The arsonists:

> "*The companies that helped turn the boreal forest into a flammable tinder-box. The same companies that have undermined attempts to rein in carbon emissions. The same companies that, by their very design, chase profits with no mind for the ecological and human consequences*."[266]

Despite the scale of the wildfire labelled 'Armageddon', no one has been held accountable. Perhaps because it is hard to place blame when these natural things occur, but it seems clear that something was fuelling the spread of this fire. Whilst fire is a natural part of the boreal ecosystem, what's happening in Fort McMurray is not natural, causing longer, more frequent, and more intense forest fires as time goes on.[267]

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[265] Guillermo Ordorica-Garcia, Sam Wong & John Faltinson, 'Characterisation of CO2 emissions in Canada's oil sands industry: Estimating the future CO2 supply and capture cost curves', (Energy Procedia, 2011) (4) Pages 2637–2644

[266] Martin Lukacs, 'The arsonists of Fort McMurray have a name', (The Guardian, 12th May 2016) <http://www.theguardian.com/environment/true-north/2016/may/12/the-arsonists-of-fort-mcmurray-have-a-name> accessed 13th May 2016

[267] Stewart RB, Wheaton E, Spittlehouse DL (1998). Climate change: Implications for the boreal forest. In: Emerging air issues for the 21st century: The need for multidisciplinary management. Proceedings. Speciality conference, Sep. 22–24, 1997, Calgary. AB. Legge AH, Jones LL (eds.). Air and Waste Management Assoc., Pittsburg, PA, pp 86-101; Goetz SJ, Bunn AG, Fiske GJ, Houghton RA (2005). Satellite-observed photosynthetic trends across boreal North America associated with climate and fire disturbance. Proceedings of the National Academy of Sciences of the United States of America 102, 13521-13525; Podur, J.J. Martell, D.L. Knight, K. 'Statistical quality control analysis of forest fire activity in Canada' (Canadian Journal of Forest Research, 2002) 32 (2) pg 195-205

The oil sands industry now emits an estimated 70 million tons of CO_2 per year,[268] down on the 80 million tons from 2011.[269] Yet despite this reduction, with production more energy-intensive than conventional oil, higher GHG emissions are expected. However, considering the complete life cycle, which includes the refinement, transportation, and consumption of oil, 80% of the total emissions occur at the end of the cycle (consumption) from burning fuel. Indeed, producing a barrel of synthetic crude oil from the oil sands releases up to three times more greenhouse gas pollution than conventional oil due to the vast amount of energy needed to heat the bitumen,[270] and the continued push of a resource that emits higher than most other sources of energy surely undermines their commitment to "take action on climate change, put a price on carbon, and reduce carbon pollution"?[271] The new levels of bitumen production create challenges for Canada to meet international commitments for overall GHG emissions reduction, which the current technology does not resolve.[272]

Current emissions, while not proven to be in breach of the national guidelines, are contributing to significant sulphate emissions when the focus should be on a reduction. Any rise in emissions could be compromising the ability of future generations to meet their needs,[273] whilst leaking

[268] OGJ editors, 'Legislation on oil sands emissions filed, (Oil and Gas Journal, 2016) <http://www.ogj.com/articles/2016/11/legislation-on-oil-sands-emissions-filed.html> accessed 21st January 2017
[269] Salameh, M. G. (2012). The potential of Unconventional Oil Resources: Between Expediency & Reality. International Association for Energy Economic. Fourth Quarter 2012 Report.
[270] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016
[271] Government of Canda, Working together to fight Climate Change, <http://www.climatechange.gc.ca/default.asp?lang=En&n=E18C8F2D-1> accessed 27th March 2016
[272] Gosselin, P., Hrudey. S. E., Naeth, M. A., Plourde, A., Therrien, R., Van Der Kraak, G., and Xu, Z. (2010). The Royal Society of Canada Expert Panel: Environmental and Health Impact of Canada's Oil Sands Industry. The Royal Society of Canada.
[273] United Nations, (1987) Our Common Future - Brundtland Report.

potentially dangerous chemicals into the air for the present generation.[274] This has led to the Ontario Energy Ministers refusal to label the oil sands "sustainable", stating "we just weren't comfortable with the wording that the oil sands are sustainable and responsible",[275] when as a nation, Ontario are utilising other sustainable forms of energy such as wind and solar power, leaving a lesser carbon footprint for both the present and future generations. The recent forest fire should be the catalyst needed to take action, focusing the attention on reducing carbon emissions and reducing the risk of danger. However, improvements to regulation, monitoring and reporting are in the pipeline. The joint *Canada-Alberta Implementation Plan for Oil Sands* aims to improve monitoring of the environment in this region. These improvements have been made a priority because no one actually knows how much air pollution the oil sands development is causing, or the effects on public health and regional eco-systems in both Canada and transboundary.[276]

Until it is known how much air pollution is caused by this industry, and the effects this is having on the environment and human health, it is impossible to label it a sustainable one with air pollution currently free to pollute water bodies, air, soils and vegetation, with little regulation.[277]

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[274] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7

[275] Source: Nathan Vanderklippe, Ontario refuses to call Alberta's oil sands 'sustainable and responsible', (The Globe and Mail, 2011) < http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/ontario-refuses-to-call-albertas-oil-sands-sustainable-and-responsible/article589650/> accessed 27th March 2016

[276] Andrea Olive, 'The Canadian Environment in Political Context' (University of Toronto Press, 2016) pg 138

[277] Kelly, E.N., Schindler, D.W., Hodson, P.V., Short, J.W., Radmanovich, R., Nielsen, C.C., 2010. Oil sands development contributes elements toxic at low concentration to the Athabasca River and its tributaries. Proc. Natl. Acad. Sci. 107, 16178–1618; Bari, M.A., Kindzierski, W.B., Cho, S., 2014. A wintertime investigation of atmospheric

2.4 Water Contamination and Tailings Ponds

The environmental issues are not solely airborne. Whilst water usage and resource usage has already been touched upon, the waste water returned to the earth is equally as damaging to ecosystems and the surrounding environment. Legally, the polluted water must not be removed from the site, being stored in large tailings ponds which aim to contain the water, treat it and return it to the environment.[278] This is intended to reduce pollution of the land and minimise risk, however it may well have the opposite result. For example, the seepage of polluted water is damaging to fish and aquatic ecosystems,[279] it pollutes the land used by grazing animals as well as polluting the river, a vital resource used by First Nation Communities.

Most of the fresh water imported by the oil sands mines is used in the hot water extraction process, which separates the bitumen from the sand and clay, creating an alkaline waste water that is acutely toxic due to high concentration of organic acids from the bitumen.[280] This waste water, or (OSPW), is stored on site in tailings ponds[281] under the zero discharge policy.[282] These

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de-position of metals and polycyclic aromatic hydrocarbons in the Athabasca Oil Sands Region, Can ada. Sci. Total Envir on. 485/486, 180–192;

[278] The Zero Discharge Policy. The Alberta Environmental Protection and Enhancement Act 1993

[279] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[280] MacKinnon, M.D. & Sethi, A. In Proceedings of Our Petrolium Future Conference, Alberta Oil Sands Technology and Research Authority, Edmonton, 1993

[281] MacKinnon MD (1989) Development of the tailings pond at Syncrude's oil sands plat, 1978-1987. AOSTRA J Res 5:109–133.

[282] Madill REA, Orzechowski MT, Chen G, Brownlee BG, Bunce NJ (2001) Preliminary risk assessment of the wet landscape option for reclamation of oil sands mine tailings: Bioassays with mature fine tailings pore water. Environ Toxicol 16:197–208.

have been constructed on site and span up to 70 km^2.[283] *The Alberta Environmental Protection and Enhancement Act 1993*[284] states that all Oil Sands Process-Affected Water (OSPW) produced must be held on site, resulting in a large containment of waste water in tailings ponds. Some of the OSPW is recycled, which reduces the demand for fresh water, however this has affected the water quality by concentrating the organic and inorganic compounds within recycled OSPW, which in turn has implications for water treatment and remediation.[285]

The current volume of impounded tailings sludge has exceeded 700 million m^3,[286] which will be reintegrated into the land through remediation, upon closure of the mine. This is stored with the intent to restore sustainable aquatic ecosystems.[287] Reclaiming the water and releasing it back into the environment presents a major challenge for the industry[288] and the sheer amount of OPSW has led to public criticism and proposed targets for a reduction of liquid tailings by the Energy Resources Conservation Board of Alberta.[289] Many of the environmental challenges to the management of the oil sands process water could however, be addressed through the

[283] Dominski, M. In Proceedings of the 3rd International Heavy Oil Conference, Alberta Energy and Utilities Board, March 2007
[284] The Alberta Environmental Protection and Enhancement Act 1993
[285] Allen EW (2008) Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. J Environ Eng Sci A 7:123–138.
[286] Ibid.
[287] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 124
[288] John P. Giesy, Julie C. Anderson, and Steve B. Wiseman, Alberta oil sands development (PNAS 2010 107) (3) 951-952
[289] The Energy Resources Conservation Board of Alberta (2009). Directive 074. Tailings Performance Criteria and Requirements for Oil Sands Mining Schemes.

selection of appropriate water treatment technology.[290] These technologies are rapidly evolving to meet the needs of oil companies, yet the viability remains unclear.[291]

The toxicity of the oil sands water on the surrounding aquatic area has been documented since the early stages of the development[292] and indeed in 1975, the drainage water from the Great Canadian Oil Sands (now Syncrude), was actually toxic to rainbow trout.[293] *MacKinnon and Retallack* went on to report the environmental hazards, risk of infiltration from the tailings ponds to the fresh water and poor water quality,[294] suggesting that organic acids were the cause of such toxicity. This was later confirmed by *Verbeek et al* using the *Environmental Protect Agency Toxicity Identification and Evaluation Protocol*.[295, 296] Similar effects were replicated in a study by *McNeil et al* into the Immunological impacts of oil sands-affected waters on aquatic life.[297] Rainbow trout were exposed in situ to oil sands-affected water which, after exposure found these fish had significantly fewer leukocytes and smaller spleens compared to the reference fish and also demonstrated increased fin erosion, indicative of infection.[298] The trout exposed to tailing-waters also showed a significantly decreased ability to produce antibodies,[299] supporting the early evidence that suggested drainage and tailings waste water is indeed

[290] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 124
[291] Ibid.
[292] Ibid.
[293] Hrudey, S.E. Characterization of wastewaters from the Great Canadian oil Sands bitumen extraction and upgrading plant. Surveillance Report. Environment Canada, Environmental Protection Service, Ottawa. 1975.
[294] MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981.
[295] EPA, Toxicity Identification and Evaluation Protocol, United States (1991)
[296] Verbeek, A. et al. In Proceedings of Oil Sands – Our Petroleum Future Conference, Edmonton, 1993.
[297] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016.
[298] Ibid
[299] Ibid

damaging to surrounding ecosystems, thus supporting both *MacKinnon and Retallack*, and *Verbeek's* findings.

Yet under the *Federal Sustainable Development Strategy for Canada*, it was noted that drinking water and water that supports aquatic ecosystems is considered critically important to the health and wellbeing of Canadians and the environment, making an important goal to protect and enhance water so that it is clean, safe and secure for all Canadians and supports healthy ecosystems.[300] Yet, as noted above, natural ecosystems exposed to tailings waters could indeed be suffering as a result of the contamination, suggesting that production is not supporting healthy ecosystems. Despite this, the repercussions for 'non-confirmation' to the *Federal Sustainable Development Strategy* are lacking. It is loosely suggested that action to mitigate any environmental impacts caused and for initiating and completing corrective and preventative action should be taken if goal 3 is not met,[301] however there is no real enforceability here and no stringent guidelines as to what must be done. This lack of transparency makes regulations hard to implement and enforce.

Furthermore, the entire Athabasca River below Fort McMurray contains sediments with high polycyclic aromatic hydrocarbon (PAH) concentrations,[302] which are linked with cancer, and in many cases these PAHs were in excess of *Interim Sediment Quality Guidelines*.[303] Certain

[300] Environment Canada, 'Planning for a Sustainable Future: A Federal Sustainable Development Strategy for Canada, 2013–2016' (Sustainable Development Office: November 2013) Goal 3
[301] <http://www.sdinfo.gc.ca/international_conventions/index_e.cfm>
[302] D.W. Schindler, W.F. Donahue and John P. Thompson, Running out of Steam? Oil Sands Development and Water Use in the Athabasca River-Watershed: Science and Market based Solutions, (University of Alberta, May 2007) pg 10.
[303] Canadian Council of Ministers of the Environment 1999; Evans, M.S. Billeck, S.B. Lockhart, L. Bechtold, J.P. Yunker, M.B. & Stern, G. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, 2002.

undisturbed areas of the River contained particularly high concentrations of PAHs compared to samples from the mainstream river,[304] indeed some samples demonstrated high enough concentrations of PAHs to cause low survival of fishes and invertebrates in sediment toxicity studies.[305]

However, this is not necessarily due to the increase in oil sands production. In an early study in 1979, before production on the scale we see today had begun, *Barton and Wallace* showed that invertebrate communities in the lower River were not as diverse as those upstream of the oil sands.[306] Yet, because PAH levels were similar both up and down stream, it was determined that it was unlikely to be caused by the oil sand deposits seeping into the River.[307] Still today, it remains unknown if the increase in oil sands mining has resulted in changes in PAH loading since this early study.[308] Yet it is clear that the high levels of disturbance in the wetlands will undoubtedly expose large new deposits of oil sands.[309] Interruption to the Rivers flow and disturbance to the wetlands could potentially increase exposure of fish and other organisms to unearthed PAHs, and any other toxic compounds in the water, but unfortunately it is not known

[304] Headley, J.V., C. Akre, F.M. Conly, K.M. Peru and L.C. Dickson. 2001. Preliminary characterization and source assessment of PAHs in tributary sediments of the Athabasca River, Canada. Environmental Forensics. 2: 335-345.
[305] Evans M S., B. Billeck, L. Lockhart, J.P. Bechtold, M.B. Yunker and G. Stern. 2002. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, Southampton UK.
[306] Barton, D.R., and R.R. Wallace. 1979. Effects of eroding oil sand and periodic flooding on benthic macroinvertebrate communities in a brown-water stream in northern Alberta. Canadian Journal of Zoology. 57: 533-541.
[307] Evans M S., B. Billeck, L. Lockhart, J.P. Bechtold, M.B. Yunker and G. Stern. 2002. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, Southampton UK.
[308] D.W. Schindler, W.F. Donahue and John P. Thompson, Running out of Steam? Oil Sands Development and Water Use in the Athabasca River-Watershed: Science and Market based Solutions, (University of Alberta, May 2007) pg 10.
[309] Ibid

if concentrations are directly consequential from the oil sands.[310] While the origin of the PAHs may be unclear, it is a major concern worth investigating as concerns over unusually high levels of rare cancers and autoimmune diseases are reported by the First Nations communities, with PAHs labelled the root cause.[311]

However, the water could be treated to restore it back to its original state, therefore lessening the negative long-term effects of the polluted waste water, yet the zero discharge policy makes this more difficult by disallowing the waste to be moved in order to undergo alternative forms of water treatment. These alternative forms of water treatment could be more affective, but due to the inability to transport the water, the proposed remediation procedures rely on natural processes to ameliorate the water quality; this creates a 'catch 22' situation,[312] but remains respectful of the proximity principle, which suggests waste should be disposed of as close to the source as possible.[313] This would aid in minimising the risks during transportation,[314] but in turn makes it harder to reclaim and restore the water to a useable state *in situ*. Whilst natural amelioration has been affective in small scale tests, it remains unclear as to the effectiveness of

[310] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 135

[311] Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7

[312] The safeguards prohibiting the transportation of polluted waste water (the zero discharge policy) are in place to minimise the impacts of pollution to the wider environment, however this in turn makes it more difficult to treat and reclaim the waste water.

[313] R. G. P. Hawkins, H. S. Shaw, 'The Practical Guide to Waste Management Law', (Thomas Telford Publishing, 1st Edn, 2004) pg 16

[314] Case C 155/91 Commission v Council [1993] ECR I-1939 para 13.

this natural process in real terms, and how the pollutants could affect aquatic and terrestrial food webs in the surrounding areas.[315]

Further research undertaken by *Ecojustice* demonstrated that pollutants emitted by oil sands facilities are contaminating the Athabasca River and its fish bearing tributaries,[316] supporting earlier research that concluded airborne contaminants from oil sands operations accumulate in nearby snow packs, which later melt into the Athabasca River.[317] Snow packs are an important resource that feed Rivers as they melt and can also be a vital drinking water resource for local communities, so any pollution to this can have widespread consequences.

However, it is not just the snow packs that feed into the River. Whilst it wasn't proven that PAH levels were increased from tailings water seeping into the River,[318] some argue that the seeping does occur, causing high concentrations of pollutants such as naphthenic acids, 100 times greater than in the natural environment, that are acutely toxic to aquatic life.[319] Yet unlike with consumption, the government has no water quality regulations for these substances.[320]

2.5 Land and the Boreal Forest

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[315] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 135

[316] Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2

[317] Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[318] Evans M S., B. Billeck, L. Lockhart, J.P. Bechtold, M.B. Yunker and G. Stern. 2002. PAH sediment studies in Lake Athabasca and the Athabasca River ecosystem related to the Fort McMurray oil sands operations: sources and trends. In: Oil and Hydrocarbon Spills III. C.A. Brebbia (ed.). WIT Press, Southampton UK.

[319] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016

[320] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 135

With the water from the tailings ponds leaking and seeping in to the land and river it is important to establish the effect this has on the surrounding land of the Boreal Forest, and its inhabitants. The Boreal Forest has a complex ecosystem that comprises a unique mosaic of forest, wetlands, and lakes. Canada's boreal forest is globally significant, representing one-quarter of the world's remaining intact forests, with the ecosystem providing water cleansing, producing oxygen and storing carbon. The 1.2 billion acre forest rivals the Amazon in size and ecological importance, supporting the world's most extensive network of pure lakes, rivers and wetlands and captures and stores twice as much carbon as tropical forests.[321] With wildlife, including billions of migratory songbirds, tens of millions of ducks and geese, and millions of caribou, the Canadian Boreal is an irreplaceable global treasure.[322] Storing an estimated 186 billion tonnes of carbon,[323] an amount equal to 27 years' worth of carbon emissions from the burning of fossil fuels worldwide,[324] the importance of preserving this jewel is colossal.

That being said, the environmental problems relating to the Boreal forest are two-fold. Boreal forests can have a remarkable role in reducing greenhouse gas emissions,[325] by absorbing more gases than it releases. This is not only essential for Canada to meet their reduction targets, but

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[321] Webber, M.G., and Flannigan, M.D. 1997. Canadian boreal forest ecosystem structure and function in a changing climate: impact on fire regimes. Environ. Rev. 5: 145–166. doi:10.1139/a97-008

[322] Greenpeace, 'Turning up the Heat: Global Warming and the Degradation of Canada's Boreal Forest' (March 2008)

[323] M.J. Apps, W.A. Kurz, R.J. Luxmoore, L.O. Nilsson, R.A. Sedjo, R. Schmidt, L.G. Simpson, and T.S. Vinson (1993). <http://www.greenpeace.org/canada/Global/canada/report/2009/10/turninguptheheat.pdf> accessed 15th May 2016

[324] Global carbon emissions during 2000–2005 averaged around 7.2 million metric tonnes per year. (International Panel on Climate Change [IPCC]) [2007]. Summary for policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller [eds.]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.)

[325] Vanhala, P, Bergström, I, Haaspuro, T, Kortelainen, P, Holmberg, M, & Forsius, M, 'Boreal forests can have a remarkable role in reducing greenhouse gas emissions locally: Land use-related and anthropogenic greenhouse gas emissions and sinks at the municipal level', (Science Of The Total Environment, 2016) 557, pg. 51-57

these forests are providing a global ecosystem service in this respect. However, land change use associated with oil sand exploitation that converts the boreal forest to other ecosystems is destroying this important carbon sink. Consequently, not only are more emissions being released by the oil sand production than before production, there is in turn less ability to absorb global carbon emissions due to the destruction of the forest, creating a disaster in terms of the global carbon cycle. This has a snowball effect as the carbon released from the production process then spurs the forest fires, which in turn release more emissions in to the atmosphere and destroys more of the forest, rendering the planet with less of an ability to absorb carbon emissions.[326] If this cycle continues, eventually there will be no Boreal Forest left to absorb these emissions, thus depriving future generations of the services provided by the forest.

Further, research suggests that intact areas of the Boreal Forest, those areas that remain in their natural states, will be better able to resist and recover from global warming impacts than those areas fragmented by mining, roads and anthropocentric development.[327] By maintaining stable and intact forests, they will help to shield the trees, plants, and animals, giving them more time to migrate and adapt successfully.[328] Biodiversity is recognised to increase ecosystem resilience,[329] which is essential for ecosystems to adapt and function in the face of climate

[326] Wang CK, Bond-Lamberty B, Gower ST (2003). Carbon distribution of a well- and poorly-drained black spruce fire chronosequence. Global Change Biology 9, 1066-1079.
[327] Noss RF (2001). Beyond Kyoto: Forest management in a time of rapid climate change. Conservation Biology 15, 578-590.
[328] Ibid
[329] Jakub Kronenberg, Tomasz Bergier, 'Challenges of Sustainable Development in Poland', (Sendzimir Foundation, 2010) pg 31; Resilience is defined as the capacity of an ecosystem to absorb disturbance without shifting to an alternative state and losing function and services. Source: Côté IM, Darling ES (2010) Rethinking Ecosystem Resilience in the Face of Climate Change. PLoS Biol 8(7): e1000438. doi:10.1371/journal.pbio.1000438

change.[330] However, habitat loss is a major cause of biodiversity loss,[331] which could hinder ecosystem functionality for future generations.

However, due to the rapidly growing oil sands industry, the Boreal forest has a growing anthropogenic footprint,[332] which is believed to result in changing environmental conditions and obstacles, potentially leading to irreversibly different environments.[333] Whilst these 'new ecosystems' are not necessarily undesirable, they are unavoidable with such heavy industrial output,[334] and therefore in order to achieve a sufficient standard of remediation, policy and regulations must be in place to account for the development of new ecosystems among highly disturbed mine sites.[335]

Since development began, 84,000 km^2 of land underlain with oil sands deposits has been leased in Alberta,[336] however this land is leased with no environmental impact assessments or consultation with stakeholders, including local First Nations. Indeed the effect this industry is having on the land used by the local aboriginal people is impacting many areas of their everyday lives. Wild-caught foods in northern Alberta have higher-than-normal levels of pollutants associated with oil sands production, either from airborne contaminants or through grazing and

[330] Ibid; Hughes T. P, Bellwood D. R, Folke C, Steneck R. S, Wilson J (2005) New paradigms for supporting the resilience of marine ecosystems. Trends Ecol Evol 20: 380–386; Mumby P. J, Steneck R. S (2008) Coral reef management and conservation in light of rapidly evolving ecological paradigms. Trends Ecol Evol 10: 555–563.
[331] Ibid
[332] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 364-371, Environment Complete, EBSCOhost, viewed 16 April 2016.
[333] Ibid.
[334] Ibid.
[335] Ibid.
[336] Alberta Energy, Alberta's Leased Oil Sands Area (June 24, 2009), <http://www.energy.alberta.ca/OilSands/pdfs/OSAagreesStats_June2009vkb.pdf> accessed 21st May 2016

water.[337] This has led to First Nations shifting away from their traditional ways and traditional diets, due to fears of contamination.[338]

The *Canadian Environmental Assessment Act 2012*[339] provides that an impact assessment should be carried out when components of the environment that are within federal legislative authority may suffer significant adverse environmental effects caused by a designated project.[340] Further, it aims to promote communication and cooperation with Aboriginal peoples and promote Sustainable Development.[341] Under Section 5, factors that should be taken into account are fish, habitats and migratory birds,[342] changes to the environment itself[343] and with respect to aboriginal people's health, social, and cultural heritage.[344] Thus, surely an assessment should have been carried out firstly on the basis of fish and habitats, but also due to First Nations health and cultural heritage and traditions. As the First Nations are now shying away from previous traditions regarding food and land use as a result of contamination,[345] surely this would have merited an assessment? Not to mention the reports of rare cancers.

[337] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)
[338] Ibid.
[339] Canadian Environmental Assessment Act 2012
[340] Ibid
[341] Ibid, Section 4 (1)
[342] Ibid, Section 5 (1)(a)
[343] Ibid, Section 5 (1)(b)
[344] Ibid, Section 5 (1)(c)
[345] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)

In addition to the destruction of a globally significant carbon sink,[346] pollution of land and in turn animals that provide a vital source of food for native communities,[347] there are also serious waste management issues in the oil sand area, in particular with the storage of waste in tailings ponds.[348] With these pollution issues raising concerns for the environment and for public health, another huge criticism of the industry stems from the destruction of habitats[349] and irreversible loss of biodiversity.[350]

2.5.2 Biodiversity and Habitats

Wetland and lakes provide critical habitat for 30% of North America's songbirds and 40% of its waterfowl, and houses a wide variety of wildlife, including bears, wolves, lynx, and some of the largest populations of woodland caribou left in the world.[351] However, the current mining and production of oil sands oil is causing irreversible ecological damage biodiversity loss.[352]

> *"When these areas are subjected to industrial activity all natural habitat is lost and all the animals that use that habitat are deceased… Animals can't just pick up and move*

[346] Webber, M.G., and Flannigan, M.D. 1997. Canadian boreal forest ecosystem structure and function in a changing climate: impact on fire regimes. Environ. Rev. 5: 145–166. doi:10.1139/a97-008
[347] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)
[348] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 135
[349] 'TAR SANDS KILLING MIGRATORY BIRDS' 2014, National Wildlife (World Edition), p. 46, Environment Complete, EBSCOhost, viewed 21 May 2016.
[350] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 7
[351] Greenpeace, 'Turning up the Heat: Global Warming and the Degradation of Canada's Boreal Forest' (March 2008); Environment Canada. Scientific Review for the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. (Ottawa: August 2008); Dr. Stan Boutin, "Expert report on woodland caribou [Ranifer taradue caribou] in the Traditional Territory of the Beaver Lake Cree Nation," July 5, 2010.
[352] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 7

> *elsewhere because those habitats are already occupied so once the habitat is lost everything that lives in that habitat is lost. The overall impact it is multifaceted – impact on water quantity and quality, air quality, habitat loss on a grand scale, loss of mammals and migratory birds, loss of trees you name it – it pretty much runs the gamut of impacts you can have including contamination of ground water."*[353]

The destructive tar sand drilling and mining in Canada has led to the deaths of thousands of songbirds and waterfowl and put millions more at risk,[354] as well as showing an increase in levels of mercury in bird's eggs in the Athabasca River delta.[355] Furthermore, according to the *Worldwatch Institute* a reported 500 ducks had mistaken an oil sands tailings-filled reservoir in Alberta as a safe place to land, only 3 ducks survived. This was only reported by Syncrude when the decomposed ducks rose to the surface, with Syncrude finally reporting an estimated 1,606 birds, mostly mallards, to have died in the polluted pond.[356] Based on these deaths, the *Natural Resources Defence Council (*NRDC) predict that in the next 50-60 years a further 166 million more birds could meet the same fate.[357]

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[353] ITF, 'DIRTY OIL: ALBERTA'S TAR SANDS', (INTERNATIONALTREEFOUNDATION.ORG, Sep 2015) pg. 13
[354] 'TAR SANDS KILLING MIGRATORY BIRDS' 2014, National Wildlife (World Edition), p. 46, Environment Complete, EBSCOhost, viewed 21 May 2016.
[355] Shawn Mccarthy & Kelly Cryderman, 'Oil sands pollutants contaminate traditional First Nations' foods: report', (The Globe and Mail, July 2014) <http://www.theglobeandmail.com/news/national/oil-sands-pollutants-affect-first-nations-diets-according-to-study/article19484551/> accessed 21 May 2016
[356] Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016
[357] Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 2

Oil sand production has created open pit mines,[358] habitat degradation,[359] toxic waste tailings ponds,[360] air[361] and water pollution,[362] upgraders and refineries,[363] and pipelines spreading far beyond the Boreal forest.[364] This oil sand production is destroying natural habitats for waterfowl and songbirds that come to nest in the Boreal forest.[365] Each year between 22 and 170 million birds breed in this region, which could eventually be non-existent.[366] Migratory birds will not

[358] Glick, D 2011, 'TAR SANDS TROUBLE', National Wildlife (World Edition), 50, 1, pp. 26-29, Environment Complete, EBSCOhost, accessed 28th January 207

[359] Michelle Mech, 'A Comprehensive Guide to the Alberta Oil Sands', (May 2011) pg 7; ITF, 'DIRTY OIL: ALBERTA'S TAR SANDS', (INTERNATIONALTREEFOUNDATION.ORG, Sep 2015) pg. 13; 'TAR SANDS KILLING MIGRATORY BIRDS' 2014, National Wildlife (World Edition), p. 46, Environment Complete, EBSCOhost, viewed 21 May 2016; Shawn Mccarthy & Kelly Cryderman, 'Oil sands pollutants contaminate traditional First Nations' foods: report', (The Globe and Mail, July 2014) <http://www.theglobeandmail.com/news/national/oil-sands-pollutants-affect-first-nations-diets-according-to-study/article19484551/> accessed 21 May 2016; Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016

[360] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; MacKinnon, M.D. & Sethi, A. In Proceedings of Our Petrolium Future Conference, Alberta Oil Sands Technology and Research Authority, Edmonton, 1993; MacKinnon MD (1989) Development of the tailings pond at Syncrude's oil sands plat, 1978-1987. AOSTRA J Res 5:109–133.

[361] C. A. Poveda & M. G. Lipsett, 'The Canadian oil sands: environmental, economic, social, health, and other impacts' (Sustainable Development and Planning VI) 581; Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf.

[362] Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[363] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[364] See pipeline map at Canadian Association of Petroleum Producers, 'Pipelines', (CAPP, 2015) <http://www.capp.ca/canadian-oil-and-natural-gas/infrastructure-and-transportation/pipelines> accessed 28th January 2017

[365] Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016; Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 2

[366] Ibid

simply relocate as they depend on a certain type of habitat,[367] thus many adult birds die when faced with lost or fragmented habitats and ponds filled with tailings waste, but future generations of birds will also have lost their chance to exist.[368] Virtually every facet of the tar sands industry has the potential to harm these birds,[369] many of which are migratory birds and should therefore be protected by treaty[370] and national law,[371] thus rendering the industry unlawful due to breaches of said treaties.

The industry is predicted to lose more forest-dependent bird habitats than strip mining.[372] It could harm as many as 14.5 million breeding birds from direct habitat loss and as many as 76 million birds from fragmentation and habitat degradation over a 30 to 50 year period. The Boreal ecosystem is at the frontlines in feeling the impacts of global warming and so are Boreal birds and ducks, which suffer as wetlands become drier.[373]

But it is not just the bird and duck populations that are suffering. Indeed a recent study found high arsenic levels in muskrat, duck and moose, and selenium levels were high enough in the muscle, kidney, and livers of all wildlife species to be of concern for adults and children alike.[374] Further, muskrats have been extirpated from the Athabasca Delta by upstream development

[367] Ibid
[368] Ibid
[369] Ibid
[370] The Migratory Bird Treaty Act; Species at Risk Act (2002)
[371] Migratory Birds Convention Act, 1994
[372] Simon Dyer, 'Eradicating Ecocide', (Witness Statement, The Pembina Institute. 2012); Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008)
[373] Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 4
[374] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

now,[375] showing the power of the industry to wipe out entire animal populations. Dietary trends, as a result of land contamination and habitat destruction will be discussed in detail in Chapter Three.

2.5.2 Remediation

The scale of the land disturbed, and in turn the knock on effect of habitat and ecosystem disturbance is monumental. Over 4700 km^2 have been leased for oil sands surface mining and in 2013, active operations have resulted in a disturbance footprint of more than 700 km^2, equating to an average land disturbance of one hectare per 100,000 barrels.[376] Although this represents a small fraction (0.02%) of the total Canadian boreal forest,[377] the rapid expansion of oil sands activities imposes considerable modifications to many aspects of the natural landscape. To date only 0.1% of land disturbed by oil sands mining have been "certified reclaimed" and returned as public land, compared with 10% being "under reclamation" and 90% still in use or disturbed.[378] However, whilst it is imperative that this land gets restored, it is unknown how best to restore these disturbed ecosystems to promote both sustainable economic development and suitable ecological outcomes to the highest level of ecological integrity.[379] Yet, whilst that is the desirable outcome, it must be acknowledged that highly assertive disturbances such as

[375] Ibid.
[376] Dyer et al., 'Quantifying barrier effects of roads and seismic lines on movements of female woodland caribou in northeastern Alberta', (Can. J. Zool., 2002) 80 pp. 839–845; Grant, J., Angen, E., and Dyer, S. 'Forecasting the impacts of oilsands expansion: measuring the land disturbance, air quality, water use, greenhouse gas emissions, and tailings production associated with each barrel of bitumen production.' (The Pembina Institute, June 2013)
[377] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 365, Environment Complete, EBSCOhost, viewed 16 April 2016.
[378] Ibid; Alberta Energy 2013, 2014
[379] Hobbs, R.J., Higgs, E.S., and Hall, C.M. (Editors). 2013. Novel ecosystems: intervening in the new ecological world order. John Wiley & Sons, Chichester, UK

mining can, and often do, cause irreversible effects to natural landscapes leading to the emergence of novel ecosystems.[380] These anthropocentric ecosystems may actually be more beneficial than the original as they are engineered in a way to maximise gain,[381] therefore the return of the post disturbance landscape to its pre-disturbance condition may not always be possible or even practical.[382]

Biodiversity patterns and biogeochemical cycles are shaped by the region's sub-humid and sub-arctic climate, its predominant brunisol and luvisol soils, and the occurrence and distribution of natural (i.e., wildfire) and anthropogenic disturbances (i.e., logging),[383] with the most recent anthropogenic disturbance being the oil sand production.[384] With expansion predicted to more than double in the next two decades,[385] the already large disturbance footprint will continue to grow.[386]

Some disturbed ecosystems following oil sands mining have been rehabilitated and "certified reclaimed", suggesting that successful land remediation is possible, however the number of sites still "under reclamation" far exceeds the number of sites that have been restored, indicating

[380] Jackson, S.T. & Hobbs, R.J. 'Ecological restoration in the light of ecological history', (Science, 2009) 325 pg 567–68
[381] Michael P Perring, Rachel J Standish & Richard J Hobbs, 'Incorporating novelty and novel ecosystems into restoration planning and practice in the 21st century', (Springer. 2013)
[382] Doley, D., and Audet, P. 2013. Adopting novel ecosystems as suitable rehabilitation alternatives for former mine sites. Ecol. Process. 2: 22. doi:10.1186/2192- 1709-2-22
[383] Bergeron, Y., Leduc, A., Harvey, B.D., and Gauthier, S. 2002. Natural fire regime: a guide for sustainable management of the Canadian boreal forest. Silva Fenn. 36(1): 81–95. doi:10.14214/sf.553
[384] Gosselin, P., Hrudey, S.E., Naeth, M.A., Plourde, A., Therrien, R., van der Kraak, G., and Xu, Z. 2010. The Royal Society of Canada Expert Panel: environmental and health impacts of Canada's oil sands industry. The Royal Society of Canada, The Academies of Arts, Humanities and Sciences of Canada, Ottawa, Ontario.
[385] Canadian Association of Petroleum Producers (CAPP). 2014. Crude oil: forecast, markets and transportation. June 2014 report. Canadian Association of Petroleum Producers, Calgary, Alberta.
[386] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 364-371, Environment Complete, EBSCOhost, viewed 16 April 2016.

that this path is neither smooth nor direct.[387] Furthermore, ecologist *Kevin Timoney* argues the wetlands that companies have left behind are defective and destructive,[388] suggesting that remediation as it stands currently is falling short of acceptable standards. Further, *Gosseling* reports that remediation is not keeping up with the pace of development and "current practises for financial security for reclamation liability leave Albertans vulnerable for major financial risks,"[389] potentially leaving a financial burden for both present and future generations of Albertans. Therefore, more safeguards are needed to ensure that firstly, more of the land reaches the status of "certified reclaimed" and secondly, that after remediation, a habitable and effective ecosystem is left behind.

Legal Requirement to Restore the Land

According to existing legislation, the particular objective of land remediation is to return the specified land to an equivalent land capability (ELC), which refers to the ability of the land to support various post disturbance land uses that are similar to pre-disturbance conditions but not necessarily identical to it.[390] Furthermore, under *CEMA 2006*,[391] Alberta's ELC framework is used as a land-capability ranking system to assess the status and productivity of a wide range of landscapes and the species that characterize them, including surface and subsurface soil characteristics, landscape factors and predominant vegetation.[392]

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[387] Ibid.

[388] Source: ITF, 'DIRTY OIL: ALBERTA'S TAR SANDS', (INTERNATIONALTREEFOUNDATION.ORG, Sep 2015) pg. 13

[389] Gosselin, P., Hrudey, S.E., Naeth, M.A., Plourde, A., Therrien, R., van der Kraak, G., and Xu, Z. 2010. The Royal Society of Canada Expert Panel: environmental and health impacts of Canada's oil sands industry. The Royal Society of Canada, The Academies of Arts, Humanities and Sciences of Canada, Ottawa, Ontario.

[390] Conservation and Reclamation Regulation section 1(e))

[391] Committee for Ethnic Minority Affairs 2006

[392] Oil Sands Vegetation Reclamation Committee (OSVRC) 1998;

Although the restored ecosystems do not need to be identical to those pre-mining, land use ELC criteria still hold a relatively narrow scope of interpretation, requiring sufficient similarity to the boreal ecozone. Therefore, land-remediation practitioners must carefully define legal boundaries, describe characteristics and properties of the landscape (e.g., topography, hydrology, predominant soils and vegetation, and land capability), document conservation and remediation procedures, and finally, monitor the improvements anticipated in post-disturbance site conditions.[393] However, the general approach of looking to the past has been widely criticized for both its narrow and static assessment of recovering ecosystems,[394] particularity those with complex natural disturbance and succession regimes, like wildfire,[395] such as the boreal forest. Looking to the past to effectively build a new ecosystem can seem counterproductive when ongoing changes in climate across the boreal forest are pushing environmental conditions beyond the range that have been experienced in the past centuries.[396] Therefore, traditional forms of land management that target idealized post-disturbance landscapes based on historical or pre-disturbance ecological criteria may not always be appropriate for mine sites, due to the significant and possibly irreversible differences between

[393] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 366, Environment Complete, EBSCOhost, viewed 16 April 2016.
[394] Harris, J.A., Hobbs, R.J., Higgs, E.S., and Aronson, J. 2006. Ecological restoration and global climate change. Restor. Ecol. 14: 170–176. doi:10.1111/j.1526-100X. 2006.00136; Hobbs, R.J., and Cramer, V.A. 2008. Restoration ecology: interventionist approaches for restoring and maintaining ecosystem function in the face of rapid environmental change. Annu. Rev. Environ. Res. 33: 39–61. doi:10.1146/ annurev.environ.33.020107.113631.
[395] Bergeron, Y., Leduc, A., Harvey, B.D., and Gauthier, S. 2002. Natural fire regime: a guide for sustainable management of the Canadian boreal forest. Silva Fenn. 36(1): 81–95. doi:10.14214/sf.553.
[396] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 367, Environment Complete, EBSCOhost, viewed 16 April 2016.

the pre and post-mining environments,[397] especially if the objective is to optimize both economic development and environmental protection.[398]

If this is the case, and indeed new anthropocentric ecosystems should be created in terms of future benefit as opposed to what was naturally there in the past, then it could be argued what is lacking is the scientific framework. This should establish what we want our future forests to look like and the types of ecosystems that may develop among highly disturbed landscapes in a global change context, particularly in relation to the concept of natural ecosystems vs anthropogenic novel ones.[399]

Novel Ecosystems

Whilst there is increasing evidence suggesting that many landscapes now contain new so-called hybrid and novel ecosystems,[400] what are the implications of the destruction of natural pre-disturbance ecosystems being replaced with anthropogenic, human engineered ones?

Novel ecosystems occur when new combinations of species appear within a particular biome due to human activity, environmental change, or impacts of introduced species, and will be increasingly common due to climate change, raising complex management and ethical dilemmas

[397] Audet, P., Arnold, S., Lechner, A.M., and Baumgartl, T. 2013. Site-specific climate analysis elucidates revegetation challenges among post-mining landscapes in eastern Australia. Biogeosciences, 10: 6545–6557. doi:10.5194/bg-10-6545-2013.
[398] Doley, D., and Audet, P. 2013. Adopting novel ecosystems as suitable rehabilitation alternatives for former mine sites. Ecol. Process. 2: 22. doi:10.1186/2192- 1709-2-22.
[399] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 367, Environment Complete, EBSCOhost, viewed 16 April 2016.
[400] Perring, M.P., Standish, R.L., and Hobbs, R.J. 2013. Incorporating novelty and novel ecosystems: are novel approaches required. Ecol. Process. 2: article 18. doi:10.1186/2192-1709-2-18

for policy makers and resource managers,[401] and there are many indications that the oil sands region now contains these.[402] Indeed the processing and refining of oil sands produces tailings materials that can considerably alter the surrounding ecosystems.

Further, whilst post-mining ecosystems may be quite different from those that occupied the site prior to disturbance, and they may be difficult to anticipate at the planning stage due to the scale of disturbance and changing environmental conditions, this does not mean that the new ecosystem services are neither valuable nor desirable.[403] Indeed what makes successful land remediation has not yet been established.[404] Whilst current legislation provides that the land must be returned to a state which supports various post disturbance land uses that are similar to pre-disturbance conditions but not necessarily identical,[405] this in itself is not clear or transparent. This may be because novel ecosystems can still produce a desirable and effective one,[406] it is imperative that the disturbed land be returned to its original functions due to its fundamental global benefit for both migratory birds[407] and its use as an extensive carbon sink.[408]

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[401] Lindenmayer, D. B., Fischer, J., Felton, A., Crane, M., Michael, D., Macgregor, C., Montague-Drake, R., Manning, A. and Hobbs, R. J. (2008), Novel ecosystems resulting from landscape transformation create dilemmas for modern conservation practice. Conservation Letters, 1: 129–135. doi: 10.1111/j.1755-263X.2008.00021.

[402] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 367, Environment Complete, EBSCOhost, viewed 16 April 2016

[403] Ibid.

[404] Ibid

[405] Conservation and Reclamation Regulation, Section (1)(e)

[406] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 367, Environment Complete, EBSCOhost, viewed 16 April 2016; Perring, M.P., Standish, R.L., and Hobbs, R.J. 2013. Incorporating novelty and novel ecosystems: are novel approaches required. Ecol. Process. 2: article 18. doi:10.1186/2192-1709-2-18

[407] Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 2

[408] Webber, M.G., and Flannigan, M.D. 1997. Canadian boreal forest ecosystem structure and function in a changing climate: impact on fire regimes. Environ. Rev. 5: 145–166. doi:10.1139/a97-008; Greenpeace, 'Turning up the Heat: Global Warming and the Degradation of Canada's Boreal Forest' (March 2008)

2.6 Summary

Nowhere in the world is there a form of oil extraction and processing which impacts more intensely on forests and wildlife, freshwater resources, and air quality.[409] Whilst providing a huge economic driver in Alberta, creating a huge amount of jobs for local native people,[410] and satisfying the economic pillar of sustainable development, it is clear that this process is far from sustainable. With only limited reserves, exploitation at this current rate will only continue to destroy the land and see an increase in emissions and pollution which will be left behind for future generations to fix. The concept of Sustainable Development provides that the economy, the environment and social aspects must all be balanced when considering a project, however the Brundtland report did also state that the development must not compromise the ability of future generations to meet their own needs.[411]

It is imperative that this pillar of SD is not forgotten. When looking at environmental damage, hand in hand with the footprint being left behind, it is clear a balance has not been struck. With the water from the Athabasca River being used in abundance to produce each barrel of oil,[412] leaving a concerning amount behind during winter months,[413] it is suggested that this may

[409] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016
[410] RP Siegel, 'Tar Sands Oil: Pros and Cons' (Triple Pundit, April 16th, 2012) < http://www.triplepundit.com/special/energy-options-pros-and-cons/tar-sands-oil-pros-cons/> accessed 17th January 2016
[411] United Nations, (1987) Our Common Future - Brundtland Report.
[412] Holowenko FM, MacKinnon MD, Fedorak PM (2002) Characterization of naphthenic acids in oil sands wastewaters by gas chromatography-mass spectrometry. Water Res 36:2843–2855; John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6
[413] Peachey, B. Strategic needs for energy related water use technologies. Water and the EnergyINet Report prepared for the Alberta Energy Research Institute, Calgary. 2005

impact not only on fish populations[414] but also on ducks[415] and other aquatic life. This is also impacting the local First Nations, who due to fears of contamination, are having to abandon their traditional ways.[416]

Whilst Canada is supposed to be a nation committed to climate change, and the industry itself marketed as a sustainable one, the air pollution from Alberta has worsened in recent years. Despite a reduction in emissions per barrel, emissions from this industry have increased by 121% between 1990 and 2008,[417] and are predicted to expand to 730% by 2020,[418] with CACs also being emitted in large volumes. These emissions, like the contamination for the tailings ponds, pose a further danger to aquatic life[419] and the life of species who mistakenly land on these ponds,[420] as well as posing a threat to local communities who are breathing in these emissions.

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[414] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016

[415] Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 4

[416] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

[417] Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf.

[418] Danielle Droitsch, Marc Huot and P.J. Partington, Briefing Note: 'Canadian Oil Sands and Greenhouse Gas Emissions', (the Pembina Institute, August 2010) pg 3 Source: Government of Canada. Turning the Corner: Canada's Energy and GHG Emissions Projections, Reference Case: 2006-2020. March, 2008. http://www.ec.gc.ca/doc/virage-corner/2008-03/pdf/nat_eng.pdf.

[419] MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981; Verbeek, A. et al. In Proceedings of Oil Sands – Our Petroleum Future Conference, Edmonton, 1993; McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016.

[420] Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016

However, contamination is often not regarded as significant as consumption, as it is harder to quantify and measure, making it harder for the general public to notice.[421] One thing that cannot go unnoticed is the sheer amount of land that has been used by this industry. With only a small fraction of the disturbed land having been remedied to date,[422] this demonstrates that the burden is going to fall on future generations to do the clean-up, and also signifies that the clean-up is of little importance. Further, the effects of remediation are unknown leaving it as a large scale experiment,[423] with an unclear answer as to what successful remediation looks like,[424] meaning the environment being left for future generations is essentially a big gamble, much like the clean-up costs,[425] demonstrating a wholly unsustainable and illegal industry.

[421] John Pearson, 'Hydrocarbon hysteria: differentiating approaches to consumption and contamination in regulatory frameworks governing unconventional hydrocarbon extraction' (J.P.L. 2015) 6
[422] Brett Purdy, (Alberta Environment)
[423] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 30th January 2016
[424] Audet, P, Pinno, B, & Thiffault, E 2015, 'Reclamation of boreal forest after oil sands mining: anticipating novel challenges in novel environments', Canadian Journal Of Forest Research, 45, 3, pp. 367, Environment Complete, EBSCOhost, viewed 16 April 2016
[425] Nathan Lemphers, Simon Dyer & Jennifer Grant, 'Toxic Liability: How Albertans Could End Up Paying For Oil Sands Mine Reclamation, (Oil Sands Fever Series, September 2010) < https://www.pembina.org/reports/toxic-liability-report.pdf> accessed 18th January 2016

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Chapter Three

Indigenous Communities, Social Impacts and Health

3.1 Wider Implications of the Oil Sand Industry

The environmental impacts stemming from tar sand production have been discussed at length but concerns over this industry do not stop at the environment. Environmental issues in turn have a knock on effect to the surrounding community's everyday lives, including the inability to operate under a traditional way of life,[426] and leading to an increase in reported health concerns, autoimmune diseases and rare cancers.[427] This has led to growing public interest in this industry, with strong and conflicting views from different stakeholders, including First Nation communities, environmentalists and the government, becoming apparent.[428] These concerns are highlighted when scrutinising treaties that should protect the rights of the local aboriginal communities. Indeed the Beaver Lake Cree have documented 20,000 treaty rights violations in the face of tar sands expansion,[429] throwing the legality of this industry into question.

Whilst this industry has generated huge economic prosperity for Canada, it is suggested a balance must be struck between this and the adverse and poorly understood implications for

[426] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11
[427] Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7
[428] Pierre Gosselin et al, 'The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry', (RSC: December 2010) pg 1
[429] The Sierra Club, 'The Truth About Tar Sands: The Dirtiest Oil on Earth', <http://content.sierraclub.org/beyondoil/tar-sands> accessed 22nd May 2016

environmental and human health.[430] The wider effects on the local communities must be understood because the land used for oil sands operations is likely to continue for the next three or more generations, restricting the usage for current and future First Nation communities.[431]

3.2 Social Impacts and First Nations Communities

It is often argued the social and economic benefits of tar sands activities outweigh the environmental harm. Indeed 49% of Canadians would agree as per *Figure 5*. However the pace of tar sands development has exceeded the capacity to deal with the negative consequences.[432] Outside of the oil sand industry, Albertans are struggling economically. Housing has become unaffordable and skilled trade workers too expensive due to high demand.[433] *Greenpeace* argue that communities feel they are being destroyed by the economic changes such as increasing substance abuse, gambling and family violence in neighbouring towns,[434] as well as threats to their everyday traditional way of life.[435]

Aboriginal communities, First Nations, Métis, and Inuit, live in every region of the country, on reserves and in towns and cities, compromising of approximately 4% of Canada's population,

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[430] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

[431] Pierre Gosselin et al, 'The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry', (RSC: December 2010) pg 11

[432] Greenpeace, 'Threats: Social costs', (April 2008) <http://www.greenpeace.org/canada/en/campaigns/Energy/tarsands/Resources/Fact-sheets/Threats-Social-costs/> accessed 22nd May 2016

[433] Thousands of workers have been brought in by the oil companies and in turn surrounding towns are facing a housing crunch with higher costs. Homelessness in Edmonton also increased by 19% in 2006 as there is not enough infrastructure or social services in Alberta to account for the demand. Source: Ibid

[434] Ibid

[435] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11; Johnson, R 2011, 'Tunnel Vision', Earth Island Journal, 26, 1, pp. 43-48, Environment Complete, EBSCOhost, viewed 22 May 2016.

roughly 1.2 million people.[436] Approximately 23,000 Aboriginal people live in Alberta's oil sands areas and have experienced these changes first hand,[437] but not all are in agreement when it comes to the future of the industry that is taking over their land.[438] Indeed whilst certain communities and individuals see the economic benefit and employment opportunities brought forth by this development,[439] other First Nations groups, including the Gitga'at, do not want to see further expansion, stating they will fight for their future generation's right to retain their traditional way of life until their last breath.[440]

For decades, Aboriginal communities have been voicing concerns about the escalating impact of the oil sands, including effects on their health, water quality, the impact on wildlife populations as well as their constitutionally protected rights and these concerns have now been elevated to national level by the *Assembly of the First Nations* (AFN),[441] demonstrating the desire of the public and those affected to participate and seek change. The provincial government attempted to balance the competing interests but the result is failure to protect aboriginal rights, lands and health from industrial development.[442] So what power do these communities have to protect their rights?

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[436] Canadian Association of Petroleum Producers, 'Aboriginal Peoples And The Oil Sands Industry' (CAPP: January 2014) pg 1

[437] Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 22nd May 2016

[438] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

[439] In 2010, there were more than 1,700 Aboriginal employees in permanent oil sands operations jobs. Source: Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 22nd May 2016

[440] Johnson, R 2011, 'Tunnel Vision', Earth Island Journal, 26, 1, pp. 43-48, Environment Complete, EBSCOhost, viewed 22 May 2016.

[441] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1

[442] Bob Weber, 'Alberta failing aboriginal people in the oilsands area: Report' (The Canadian Press, Feb 2016)

3.2.1. Public Participation

The power of the people is hugely influential and was demonstrated in the US with the rejection of the Keystone XL Pipeline in 2015. This was a shock for those who considered the pipeline a 'done-deal',[443] demonstrating through public participation change can happen. This could suggest that through aboriginal involvement, remedies can be found to rectify the situation.

Public participation is the process by which an organization consults with interested or affected individuals before making a decision or development. Successful participation should be a two-way dialogue with the goal of achieving better and more democratic decisions.[444] Indeed this principle suggests that public opinion should affect the outcome of the decision which they have been consulted on.[445] Yet whilst public participation has become an important tool and globally recognised method when addressing environmental issues and climate change,[446] this can also mean that those with a bias or uneducated opinion may influence the decision.[447]

This could enable the provincial government to influence the public with biased or misinformed opinions in order to achieve their desired outcome, which some suggest was the case during the 'brexit' referendum.[448] Indeed the Alberta government markets the oil sands as a sustainable

[443] Greenpeace, 'Threats: Social costs', (April 2008) <http://www.greenpeace.org/canada/en/campaigns/Energy/tarsands/Resources/Fact-sheets/Threats-Social-costs/> accessed 22nd May 2016
[444] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) 1-322
[445] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) pg 208
[446] Nazrul Islam, Isabel Martínez and Wang Xi, 'Environmental Law in Developing Countries', (Engelska, 2002) pg 7
[447] Gene Rowe & Lynn J. Frewer, 'Public Participation Methods: A Framework for Evaluation', (Science Technology Human Values, 2000) 25 (3)
[448] Ben Worthy, 'Brexit and Open Government in the UK', (University of London, December 2016)

and necessary form of energy,[449] which as a limited resource causing so much environmental damage is in itself impossible. Despite this, the promotion of public participation has been emphasised in recent years as the local public are able to provide indigenous knowledge, which will improve the quality of the final decision for the benefit of those who will be impacted by it. Further, public participation can help support the different interests of groups and stakeholders,[450] which can therefore be considered more democratic and representative of those who share a common interest. That being said, more emphasis should be placed on the opinion on the local aboriginal groups, as they are the communities that will be most affected by this industry for years to come, even after production has ended.

However, as public participation in natural resource management could be considered a means of slowing or even stopping the 'treadmill of production',[451, 452] perhaps that is why the relevant stakeholders, i.e. First Nations, are not being listened to. The government has a significant stake in accelerating the development of this industry and with the price of oil in decline, facing the industry with a potential $6 billion deficit, the government is proposing further expansion using pipelines to reach faraway markets to capture a higher price tag.[453] This further demonstrates the position of the government; driven by the desire to make more money, larger withdrawals will be made from the natural environment, with larger additions of pollution, in order to further

[449] Alberta Government, 'Alberta Oil Sands', (Alberta's Clean Energy Story, 2014) <http://oilsands.alberta.ca/cleanenergystory.html> accessed 22nd May 2016
[450] Brewer, J.F., 2013. From experiential knowledge to public participation: social learning at the community fisheries action roundtable. *Environmental Management*, 52 (2) pg 332
[451] Schnaiberg, A. 'The environment: from surplus to scarcity' (OUP, 1980)
[452] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 59
[453] Ibid

economic growth under the guise of social welfare.[454] Whilst the principle of SD allows harm to the environment as long as all pillars have been considered, it seems as though the economic benefit outweighs the risk of society being able to participate effectively and the environmental risks considered, thus undermining the purpose of public participation which looks to achieve a democratic and informed decision.[455]

Comparative Case Study

Comparisons can be drawn with large projects in the UK, whilst not on the same scale the underlying drivers are the same. The development of HS2 was approved by parliament through the use of a hybrid bill, preventing the use of effective public participation.[456] Further, the participation itself turned into 'a mere consultation', involving the public as a 'box-ticking exercise' instead of actually listening to the oppositions concerns.[457] A report by the *Public Administration and Constitutional Affairs Committee* found that HS2 Ltd had not effectively involved the public or understood the duty upon them to communicate effectively, stating further action was required to deliver a paradigm shift in culture and attitudes, in order to improve how HS2 Ltd communicates and engages with residents, and how it deals with their complaints.

[454] Gould et al. 'The treadmill of production: injustice and unsustainability in the global economy', (CO: Paradigm Publishers, 2008)
[455] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) 1-322
[456] The question for the Supreme Court was whether the process to be adopted in relation to the HS2 project will be compliant with EU Directive 2011/92/EU and, in particular, whether it will facilitate the degree of public participation called for by the Directive. R (HS2 Action Alliance Limited) v The Secretary of State for Transport [2014] UKSC 3
[457] Public Administration and Constitutional Affairs Committee, 'Follow up to PHSO Report of an investigation into a complaint about HS2 Ltd.' (22nd March 2016) < http://www.publications.parliament.uk/pa/cm201516/cmselect/cmpubadm/793/79302.htm>

This highlights the necessity for a transparent and open dialogue with the public and for information to be accessible and understandable,[458] underpinning the fundamental principles of the rule of law.[459] If this were applied to the oil sands, it could be suggested the lack of consultation with First Nations, and lack of accessible and transparent data, is undermining the rule of law and in turn the democracy of the local community.

Consultation during early stages could ensure concerns and values expressed by different communities were integrated into the regional and national energy goals,[460] however the Canadian government has seemed to follow a 'decide-announce-defend' approach much like the HS2 development,[461] countering the purpose of the consultation. This was seen during the development stage for the Northern Gateway Pipeline, when the minister of natural resources dismissed the opposition as being rallied by "environmental and other radical groups",[462] with no concern given to the views and opinions of those protesting, despite more than 1,550 consultation meetings between First Nations and the industry in 2011 and 2012.[463]

In order for these consultations to be deemed successful, and to successfully implement public participation in environmental decision making, not just in the oil sands region but globally,

[458] Ibid.

[459] Dicey argued no one could be punished except for breaches of law and government actions must be authorized by law, requiring laws under which people are condemned to be passed in the correct legal manner and guilt should only be established through the ordinary trial process. Transparency is essential, the main components of which are a clear set of laws that are freely and easily accessible, strong enforcement structures, and an independent judiciary. Source: A. V. Dicey. *An Introduction to the study of the Law of the Constitution* (6th edn. Macmillan & Co. 1902)

[460] P. Devine-Wright, 'From backyards to places: Public engagement and the emplacement of renewable energy technologies', (Renewable Energy and the Public: From NIMBY to Participation: London, 2011)

[461] Ibid

[462] L. Payton, 'Radicals Working Against Oilsands', (CBC News, Ottawa: 2012)

[463] Canadian Association of Petroleum Producers, 'Aboriginal Peoples And The Oil Sands Industry' (CAPP: January 2014) pg 1

Governments will need to understand the complexities of citizen acceptance by understanding how proposals will connect or clash with different core values.[464]

One of the main issues for Canada presently is they lack a national energy plan. This leaves governments implementing projects often in an uncoordinated patchwork of decisions.[465] Potentially, public disagreement could be alleviated by trust[466] and the provision of a strong, consistent vision by political leaders, lifting any uncertainty regarding project benefits and risks.[467] This vision should be communicated through consultation which should achieve tangible agreements that will allow First Nation and Metis communities to enjoy the benefits of the development yet instead, the communities merely have to adapt to the negative impacts of it.[468]

Summary of Public Participation in the Oil Sands

The question of public participation rarely centres around whether avenues exits for the public to be heard, which in the case of the oil sands they do,[469] but on the extent to which definitions of 'public participation' allow the publics decision to influence processes;[470] after all, that is what

[464] Axsen, J, 'Citizen acceptance of new fossil fuel infrastructure: Value theory and Canada's Northern Gateway Pipeline', (Energy Policy, 2014) 75, pg 255-265
[465] Ibid.
[466] Aas, P. Devine-Wright, T. Tangeland, S. Batel, A. Ruud, 'Public beliefs about high-voltage powerlines in Norway, Sweden and the United Kingdom: a comparative survey', (Energy Res. Soc. Sci., 2, 2014), pg 30–37; J. Firestone, W. Kempton, M.B. Lilley, K. Samoteskul, 'Public acceptance of offshore wind power across regions and through time' (J. Environ. Plann. Manag., 55, 2012), pg 1369–1386
[467] R.Y. Shum, Social construction and physical nihilation of the Keystone XL pipeline: lessons from international relations theory (Energy Policy, 2013) 59, pg 82–85
[468] Dr Pierre Gosselin et al, 'The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry', (December 2010) pg 18
[469] The avenues of public participation involve project approvals, Environmental Impact Assessments, consultation under The Government of Alberta Act 1993 (49) (1), public hearings and ERCB license hearings and appeals procedures. Source: Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62-76
[470] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62

is deemed successful in terms of public participation.[471] Therefore, in order for participation to be successful in the oil sands industry, with the public able to demonstrate they can induce significant social reform,[472] the public must have the capacity to halt, or scale back, production, expansion and development, even if they are important sources of state revenue.[473]

Because of the economic position, and significant source of employment, the tar sands represent a difficult test for public participation as if the opposition were successful in terms of halting or stopping the development,[474] this would cause serious issues for the state.[475] In terms of SD, it could therefore be argued if the environment and social impacts overruled the economic benefit and the industry were to effectively halt, this could collapse the Canadian economy. Therefore, some theorists argue there should be a restriction upon participatory channels.[476] Yet the ecological dimension is equally proportionate to the economic,[477] with the host of environmental concerns, treaty violations and First Nations health and traditions at stake.[478] Proponents of a strong ecological modernisation and participatory approach would therefore encourage the development of a democratic, participatory process,[479] which is largely not the

[471] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) pg 208
[472] S. Arnstein, 'A ladder of citizen participation', (Journal of the American Institute of Planners, 1969) 39 (4) pg. 216
[473] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62
[474] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) pg 208
[475] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62
[476] Gene Rowe & Lynn J. Frewer, 'Public Participation Methods: A Framework for Evaluation', (Science Technology Human Values, 2000) 25 (3)
[477] Ibid; Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62
[478] D. J. Tenenbaum, 'Oil Sands Development: a health risk worth taking?', (Environmental Health Perspectives, 2009) 117 pg 150-156
[479] Gene Rowe & Lynn J. Frewer, 'Public Participation Methods: A Framework for Evaluation', (Science Technology Human Values, 2000) 25 (3)

case at present. Indeed, very few proposed developments are amended or denied by regulators,[480] supporting the notion that public participation is merely a 'tick box exercise'.[481] In fact, it is argued that the inability for the public to halt or stop a development is actually limited by the very legislation that appears to encourage this,[482] demonstrating a muddy, non-transparent and counterproductive process for the public to participate in decisions that affect their everyday lives. However, with opinions among Albertans and First Nations on opposite ends of the scale,[483] creating an outcome to appease everyone would be impossible.

3.3 Living and Working in the Region

Whilst aboriginal people may be benefiting from oil sands projects presently, this doesn't mean that this will always be the case and this is exactly what is causing local First Nations to be concerned. For the benefit to be sustainable for these native communities it must remain a benefit for the long term. In 2010, there were more than 1,700 Aboriginal employees in permanent oil sands operations jobs in northeast Alberta, not including construction-related jobs.[484] The concern here is what will happen when the production is complete and remediation finished. If the land is returned to a state where it can be used then are these communities to return to their old way of life with the benefits and jobs taken away, rendering the region a

[480] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 72
[481] Public Administration and Constitutional Affairs Committee, 'Follow up to PHSO Report of an investigation into a complaint about HS2 Ltd.' (22nd March 2016) <http://www.publications.parliament.uk/pa/cm201516/cmselect/cmpubadm/793/79302.htm>
[482] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 71
[483] The Fork McKay Group support the development with career prospects and opportunities benefitting them, yet Athabasca Chipewyan First Nations oppose the development due to the adverse environmental effects. Source: Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. (Alberta: January 2014)
[484] Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 22nd May 2016

'ghost town'?[485] And what if the land is not useable after this large scale experiment,[486] how will these communities return to a traditional way of life if they are unable to use their land as needed?

3.3.1 Economy

Many major oil sands companies have Aboriginal employment policies to recruit local residents providing an incentive for them to support the development, gaining industry backing from the Fort McKay First Nations.[487] However, this could be considered a means to appease these communities and deter them from opposing development. Nevertheless about 10% of the oil sands workforce was Aboriginal and from 1998 to 2010 and Aboriginal-owned companies secured over $5 billion worth of contracts from oil sands companies in the region; this includes $1.3 billion in 2010 alone[488] demonstrating the obvious and immediate economic benefit to these particular communities. This is seen by the industry as doing a favour for these communities,[489] perhaps as a way to justify the negative social and environmental impacts that this industry is also causing.

The *Fort McKay Group*, completely owned by the Fort McKay First Nations, works extensively with oil sands companies resulting in more than $100 million in annual revenue,[490] highlighting

[485] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Kyle Harrietha, general manager of the Fort McMurray Metis (January 2014)
[486] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 30th January 2016
[487] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Jim Boucher, chief of Fort McKay First Nation (January 2014)
[488] Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 31st May 2016
[489] Alberta Government, 'Aboriginal People', (Aboriginal People in the Region, 2014) <http://oilsands.alberta.ca/aboriginalpeople.html> accessed 22nd May 2016
[490] Ibid

the mixed opinions of this industry among the First Nations. The chief of Fort McKay First Nations has stated there is great opportunity to be employed and benefit from this industry.[491] Whilst this is one of the only economic options available to them, Fort McKay itself has virtually no unemployment, everybody is working and making a good wage and more aboriginal people are coming from all over Canada to work in the oil sands, demonstrating further aboriginal support.[492] Yet the general manager of the Fort McMurray Metis, *Kyle Harrietha*, states the bitumen mine is a "jaw dropping experience" for anyone who comes to the oil sands for the first time and sees the scale of the operations, arguing it is not just about the economy and the jobs, it is all about balance, finding ways to efficiently manage an environmentally damaging industry to ensure that everyone sees a boon.[493] However this perhaps suggests the communities are weighing up their rights to the economic benefit of the industry as opposed to thinking about the bigger picture. Surely the correct balance would be to minimise risks to the environment whilst ensuring that the economy thrives,[494] not merely ensuring that everyone receives an equal share of the profit.

This suggests that concerns here are anthropocentric and selfish in nature,[495] supporting *Wolinson*[496] who argued human concern for the environment when it comes to developments

[491] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Jim Boucher, chief of Fort McKay First Nation (January 2014)
[492] Ibid
[493] Ibid. Speaker - Kyle Harrietha, general manager of the Fort McMurray Metis
[494] United Nations, (1987) Our Common Future - Brundtland Report.
[495] With concerns for certain First Nation communities centring on the share of the profit, this suggests they are only concerned with the financial benefit. Much like the notion of 'Nimbyism', which suggests the public get involved due to selfish concerns such as house prices and so on. Source: Burton, J. and Hubacek, K., 2007. Is small beautiful? A multicriteria assessment of small-scale energy technology application in local governments. Energy Policy, 35(12), 6402-6412.
[496] Wilkinson, S.J. Sayce, S.L. & Christensen, P.H., 'Developing Property Sustainably', (Routledge, 1st Edn, 2015) pg 34

and projects often boils down to self-interest.[497] In this case, the concern is that 'everyone should see a boon'.[498] Often in developments in the UK, concern stems from worry over house prices and tourism,[499] which both at the heart relate to finance and the economy, with little direct concern for the environment itself. This has been the same since concerns relating to the environment first became apparent.[500]

Whilst these arguments seem to support the development in terms of the economic benefit, Athabasca Chipewyan First Nation Chief *Allan Adam* has continued to publicly fight against the development, highlighting the environmental risks[501] and the fundamentally flawed regulatory regime.[502] Yet it seems a universal opinion that economic growth is likely to predominate the social and environmental elements,[503] in stark contrast to the fundamental purpose of sustainable development which provides there should ideally be gains for all three pillars.[504] That being said, planning should not impede economic growth,[505] suggesting that maybe it is the

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[497] Cochrane, Alasdair (2006) Environmental ethics. Internet Encyclopedia of Philosophy . ISSN 2161-0002; Burton, J. and Hubacek, K., 2007. Is small beautiful? A multicriteria assessment of small-scale energy technology application in local governments. Energy Policy, 35(12), 6402-6412; Wilkinson, S.J. Sayce, S.L. & Christensen, P.H., 'Developing Property Sustainably', (Routledge, 1st Edn, 2015) pg 34

[498] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Kyle Harrietha, general manager of the Fort McMurray Metis (January 2014)

[499] The navitus bay development in the UK has seen a lot of opposition due to the wind farm impacting views, making it a less desirable area, in turn influencing local tourism. Source: Navitus Bay Development Limited (NBDL) 2014, p.42

[500] Rachel Carson's Silent Spring alerted readers to how the widespread use of chemical pesticides was posing a serious threat to public health and was also leading to the destruction of wildlife. Whilst this sparked concern surrounding the environment, this was mainly due to concerns over public health and not the environment itself, but rather the indirect affect this would cause for humans. Source: Rachel Carson, 'Silent Spring', (Mariner Books, 1st edn. 1962)

[501] Ibid. Speaker - Allan Adam, Chief Athabasca Chipewyan First Nation

[502] Eriel Deranger, communications manager of the Athabasca Chipewyan First Nation (ACFN), 'Athabasca Chipewyan First Nation pulls out of Grand Rapids Hearings: Citing Prejudiced Process that favors Industry' (ACFN: July 2015)

[503] Alec Samuels, 'Sustainable development: what is it?', (J.P.L., 2013) pg 1374

[504] National Planning Policy Framework ("NPPF") para.14

[505] Ibid para. 19

correct approach to prioritise the economy. This balance will be analysed in greater detail in the next chapter.

First Nations have also noted the importance of pursuing other avenues to diversify the economy to ensure when the oil sands are gone, this region will continue to bloom and not 'turn into a ghost town'.[506] Whilst it is important that it is understood there is no longevity to this industry, thus no sustainability, it raises the question as to why more environmentally sustainable forms of energy are not being researched and utilised in order to create more stability for the economy and future generations. Indeed many assessments have shown that there is enough primary energy available from renewable sources to meet global energy needs.[507] Further, with the price of oil and gas, and the cost of extraction ever on the rise, the costs of renewables and of more efficient end-use technologies continue to fall, thus shifting the balance towards low-carbon technologies.[508] The answer is simple: the profit is worth more than the people.[509]

3.3.2 Land Use and Habitats

Indeed the economy seems the predominant pillar of Sustainable Development,[510] but the environment should be more of a concern for First Nations, in particular the ability to use their land. *Casey Camp-Hornik*, an activist for climate change and aboriginal communities supports this notion, stating:

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[506] Ibid
[507] Robert L. Evans, 'Fueling Our Future: An Introduction to Sustainable Energy', (Cambridge University Press) Part 1; Department of Energy's National Renewable Energy Laboratory (NREL) (January 2006)
[508] International Energy Agency (IEA), 'World Energy Outlook 2015' (IEA, Executive Summary OECD/IEA, 2015) pg 6
[509] 'Profits before people?' 2009, Canadian Mining Journal, 130, 3, pp. 14-15, Environment Complete, EBSCOhost, viewed 15 June 2016.
[510] Alec Samuels, 'Sustainable development: what is it?', (J.P.L., 2013) pg 1374

> *"We have the right to air. We have the right to breathe. We have the right to eat food that is nutritious; the food has the right to grow. The four legs has a right to live, to breathe, and drink, and eat. The wings have a right to fly in clean air. The creepy crawlers have a right to live in balance. We have the right to stop climate change on behalf of all our relatives in all directions."*[511]

These are the factors that seemingly have been overlooked for these communities. The concern is not merely superficial, the issue at hand is the destruction of their culture, a traditional way of life. Whilst the Alberta government has 'attempted' to balance competing interests in this region, the result is a failure to protect aboriginal rights, lands and health from industrial development, eroding traditional land use in favour of economic interests.[512] Further to this, it is not just the land at present being affected by this industry but the benefit for future generations is also being impeded. This has led to *Allan Adam*, Chief Athabasca Chipewyan First Nation, to pull out of the development consultation hearings regarding further pipeline expansion, citing prejudice. He stated "It is our law that we need to protect the land and the water so that our people will be here for another 9000 years",[513] suggesting the inability to achieve this if production and expansion were to continue to grow. This demonstrates not only the inability for the present First Nations to enjoy the benefit of their land, but also for the future generations. This further demonstrates the unsustainability of this industry with regards to the

[511] Press Statement: Lizzie Gunggoll, 'Standing Our Sacred Ground – First Nations, Tribal Leaders & Land Owners Send Message To Canada, Stop Tar Sands At The Source', (First Peoples Worldwide, April 2014)

[512] Bob Weber, 'Alberta failing aboriginal people in the oilsands area: Report' (The Canadian Press, Feb 2016)
[513] Eriel Deranger, communications manager of the Athabasca Chipewyan First Nation (ACFN), 'Athabasca Chipewyan First Nation pulls out of Grand Rapids Hearings: Citing Prejudiced Process that favors Industry' (ACFN: July 2015)

longevity, highlighting that consultation is not effective[514] due to breaches of constitutional rights.[515] Indeed the former chief of the AFN supports this notion stating "the federal government is neglecting its environmental responsibilities and ignoring our concerns", suggesting that legal action to protect their treaty rights is the only way to turn.[516]

Aboriginal communities rely heavily on the land in this region for water and wildlife for hunting, fishing, trapping, gathering, harvesting and recreational uses such as bathing and cooking.[517] These traditions are not insignificant, they are a way of life and the pace and scale of the development, and in turn the inability to use the land as needed, has cast doubt into the minds of these communities. This has prompted questions as to whether the negatives outweigh the positives.[518] Supporting this theory, First Nations communities are increasingly asserting that the Canadian and Albertan Governments have violated their rights to the land and called for a moratorium to oil sand approvals until land management planning occurs.[519]

With fishing and hunting being imperative to these communities, this brings into question the results found by *Hrudey*,[520] *MacKinnon* and *Retallack*,[521] who suggested the pollution from the tailings ponds is in turn polluting the land and causing defects and toxicity to the fish. This calls into question what adverse effects may be caused as a result of this. As a precaution, First

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[514] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 71
[515] Canada Constitution Act 1867, Section 91 (24)
[516] AFN (September 2010) speaker: Chief Shawn A-in-chut Atleo
[517] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1-2
[518] Ibid
[519] Ibid
[520] Hrudey, S.E. Characterization of wastewaters from the Great Canadian oil Sands bitumen extraction and upgrading plant. Surveillance Report. Environment Canada, Environmental Protection Service, Ottawa. 1975.
[521] MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981.

Nations have reported they no longer eat fish from the Athabasca River for fear of contaminants. Subsistence hunters now have to range great distances to find woodland caribou as herds scatter and the animals' numbers are in decline.[522] Clear-cutting, pit mining and giant tailings ponds have disturbed 75% of the habitat used by caribou and with such high levels of disturbance, "they have at best a 50-50 chance of survival."[523]

Caribou are a hugely important species to Aboriginal groups, for cultural and spiritual reasons and First Nations have a constitutionally protected right to hunt woodland caribou.[524] These herds are considered self-sustaining[525] and are therefore an important part of the traditional diet for these communities.[526] Scientists predict that if action such as land protection is not taken soon, caribou could disappear completely from north-eastern Alberta.[527] This extinction could result in extinction of the people, according to *Chief Janvier*, Chipewyan Prairie Dene First Nation, who stated “when the caribou are dying, the land is dying”.[528]

Further species used as a traditional source of food to these communities have also been impacted. As a result of a freedom of information request, it was discovered that between 2000 and 2008, black bears, deer, red foxes, coyotes, moose, muskrats, beavers, voles, martens,

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[522] Glick, D 2011, 'TAR SANDS TROUBLE', National Wildlife (World Edition), 50, 1, pp. 26-29, Environment Complete, EBSCOhost, viewed 15 June 2016.
[523] Peter Lee, executive director of Global Forest Watch Canada, Source: Ibid.
[524] Danielle Droitsch and Terra Simieritsch, ‘Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities’ (Briefing Note, September 2010) pg 4
[525] Environment Canada. Scientific Review for the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. (Ottawa: August 2008).
[526] Danielle Droitsch and Terra Simieritsch, ‘Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities’ (Briefing Note, September 2010) pg 4; Ibid
[527] Dr. Stan Boutin, “Expert report on woodland caribou [Ranifer taradue caribou] in the Traditional Territory of the Beaver Lake Cree Nation,” July 5, 2010.
[528] Chief Janvier, Chipewyan Prairie Dene First Nation, Source: Danielle Droitsch and Terra Simieritsch, ‘Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities’ (Briefing Note, September 2010) pg 4

wolves and bats perished in the vicinity of tar sands operations, leading to disquiet among scientists who believe that provincial and national governments are not accurately monitoring effects of the industry.[529]

If correct, these figures suggest a monumental decrease in ability for First Nations to hunt, fish and eat on their land as protected by Treaties, rendering this traditional way of life radically transformed, with a loss of habitat and wildlife populations at a landscape scale.[530] However, First Nations have made a particular effort to gain some measure of control over resources on their traditional territories as seen in *Haida*[531] and *Taku*,[532] leading to discussions over the government's "duty to consult and accommodate" with Indigenous peoples before proceeding with development on their lands.[533] The court required that governments and, implicitly, companies consult with affected Aboriginal communities before proceeding with development, providing appropriate accommodation and compensation for the disruption of wildlife, lifestyles or the land.[534] If this precedent were followed, all First Nations should be entitled to claim against the government and individual companies if these consultation procedures were not

[529] This study linked the yearly deaths of 458 to 5,029 birds from at least 43 species to the toxins contained in tailings ponds. Noting that annual mortality data provided by energy companies and the government "underestimate actual mortality," the scientists wrote that even their own estimate "represents an unknown fraction of true mortality." Source: Kevin Timoney & Robert Ronconi, (Wilson Journal of Ornithology, September 2010)

[530] Fiona Schmiegelow, Source: Glick, D 2011, 'TAR SANDS TROUBLE', National Wildlife (World Edition), 50, 1, pp. 26-29, Environment Complete, EBSCOhost, viewed 15 June 2016.

[531] Haida Nation v British Columbia (Minister of Forests), 2004 SCC 73

[532] Taku River Tlingit First Nation v British Columbia (Project Assessment Director), 2004 SCC 74

[533] Indian Resource Council, 'First Nations Engagement in the Energy Sector in Western Canada', (IRC, June 2016) pg 6; Haida Nation v British Columbia (Minister of Forests), 2004 SCC 73; Taku River Tlingit First Nation v British Columbia (Project Assessment Director), 2004 SCC 74

[534] Ibid

followed, providing a remedy to them. However it is not just enjoyment of their land at stake, but the health of these communities as well.

3.3.3 Health

The Mikisew Cree have argued that water pollution from the oil sands development may be linked to increased incidents of cancer, especially to those downstream.[535] In a hearing in 2009 before a *Federal Standing Committee on Environment and Sustainable Development*, representatives from seven First Nations testified they had significant concerns about deteriorating water quality and contamination in the Athabasca watershed.[536] *Dr John O'Connor's* research gave further support for this, as he highlighted a high number of cases of unusual cancers, particularly cholangiocarcinoma, a rare form of bile duct cancer.[537] The population of Fort Chipewyan was 1,200 in 2003 when Dr John O'Connor started to investigate the string of cases involving cholangiocarcinoma, which normally only affects one in 100,000 people. Dr John O'Connor saw six people in a row with the suspected cancer in this small town,[538] signifying something was not right.

In response to the disquiet, in February 2009 the *Alberta Cancer Board* released a study finding that the number of cases of cholangiocarcinoma was within the expected range, however the

[535] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1
[536] The Fort McKay, Mikisew Cree, Athabasca Chipewyan, Northwest Territories of the Assembly of First Nations, Fond due Lac First Nations, Smith's Landing First Nation and Dehcho First Nation all testified to the Canadian Standing Committee on Environment and Sustainable Development in May 2009 raising concerns about oil sands development and impacts to water. Source: Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1
[537] Laura Westra, 'Environmental Justice and the Rights of Ecological Refugees', (Earthscan, 2009) pg 122
[538] Ibid

report did find the overall cancer rate was approximately 30% higher than expected,[539] and indeed the incidence rate of cholangiocarcinoma in Alberta First Nations was two to three times higher than that in non-First Nations people,[540] suggesting there is a link between the cancer and the lifestyle. Further support for the link between First Nations and cholangiocarcinoma was found by *McLean & Patel*, in research that found a higher incidents of the rare cancer in American Indian/Alaska Native people compared to non-First Nations people.[541] Further, the study found a three-fold increase in leukaemias and lymphomas, a seven-fold increase in bile duct cancers and an increase in other cancers, such as soft tissue sarcomas and lung cancers in women.[542] Despite these findings, it was said that this was most likely due to chance[543] and there was no problem.[544] Yet the *Natural Resources Defence Council* argue:

> *"Leukemias and lymphomas have been linked in the scientific literature to petroleum products, including VOCs, dioxin-like chemicals and other hydrocarbons. Biliary cancers have been linked to petroleum and PAHs. Soft tissue sarcomas are very rare and lethal cancers that have also been linked to dioxin-like chemicals and hydrocarbons."*[545]

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[539] Alberta Cancer Board, 'Cancer Incidence in Fort Chipewyan, Alberta 1995-2006' (Division of Population Health and Information: February 2009) pg 29

[540] Ibid

[541] McLean L, Patel T. Racial and ethnic variations in the epidemiology of intrahepatic cholangiocarcinoma in the United States. Liver Int 2006; 26(9):1047-1053.

[542] Alberta Cancer Board, 'Cancer Incidence in Fort Chipewyan, Alberta 1995-2006' (Division of Population Health and Information: February 2009)

[543] Alberta Cancer Board, 'Cancer Incidence in Fort Chipewyan, Alberta 1995-2006' (Division of Population Health and Information: February 2009) pg 30

[544] Alberta Health Services. Fort Chipewyan cancer studies finding released. Press release, February 6, 2009. http://www.albertahealthservices.ca/500.asp. The press release stated: "A study of the cancer incidence in Fort Chipewyan finds levels of the rare cancer cholangiocarcinoma are not higher than expected."

[545] Gina Solomon, 'The Other Oil Disaster: Cancer and Canada's Tar Sands', (Opinion-editorial, Natural Resources Defense Council, May 3, 2010) < http://switchboard.nrdc.org/blogs/gsolomon/the_other_oil_disaster_cancer.html> accessed 15th June 2016

Stating "it's an interesting pattern — almost all of the cancer types that were elevated have been linked scientifically to chemicals in oil or tar."[546] Whilst these illnesses could indeed be due to chance, the most likely culprit is the chemicals and elevated pollution from this industry. Industry-sponsored research suggested the high pollution levels are due to the natural erosion of oil sands, the National Academy of Sciences has found this to be inaccurate,[547] supporting that this is no mere coincidence as suggested by the Alberta Cancer Board,[548] the cancers and the oil emissions are inextricably linked.

Yet, *CAPP* and the *Royal Society of Canada* still conclude there no evidence of linkage between health issues in local communities and the oil sands development.[549] They argue there is currently no credible evidence that environmental contaminant exposures from the oil sands are expected to cause elevated human cancer rates in Fort Chipewyan, that current evidence on water quality impacts on the Athabasca River system suggest the oil sands are not a current threat to aquatic ecosystem viability and current ambient air quality monitoring data for the region shows minimal impacts from oil sands development on regional air quality except for noxious odour emission problems over the past two years.[550] However, *CAPP*, acting as the voice for the Canadian oil industry,[551] will naturally bring bias to the findings of this industry and

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[546] Ibid

[547] Erin N. Kelly, David W. Schindler, Peter V. Hodson, Jeffrey W. Short, Roseanna Radmanovich, and Charlene C. Nielsen. Oil sands development contributes elements toxic at low concentrations to the Athabsca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America, July 2, 2010.

[548] Alberta Cancer Board, 'Cancer Incidence in Fort Chipewyan, Alberta 1995-2006' (Division of Population Health and Information: February 2009) pg 30

[549] Canadian Association of Petroleum Producers, 'Aboriginal Peoples And The Oil Sands Industry' (CAPP: January 2014) pg 2

[550] Ibid

[551] "The Canadian Association of Petroleum Producers (CAPP) is the voice of Canada's upstream oil and natural gas industry. We enable the responsible growth of our industry and advocate for economic competitiveness and safe, environmentally and socially responsible performance." Source: CAPP, 2015 < http://www.capp.ca/> accessed 16th June 2016

government-sponsored research,[552] suggesting that these findings are not credible. Indeed they contradict the conclusions drawn from independent research conducted by *Howell et al*, in which they found the oil sands were a contributor of high sulphate and aerosol emissions.[553] With the leaking of potentially dangerous chemicals into the air for the present generation,[554] which could also be compromising the ability of future generations to meet their needs,[555] this demonstrates the other side of the argument. Whilst these studies may also carry their own bias, they do demonstrate an undeniable rise of emissions which, as with any oil development, carry consequences to the surrounding area and in turn, to the surrounding communities. Further criticism of *CAPP* and the Albertan government's findings can be seen in the studies by *Hrudey 1975, MacKinnon and Retallack 1981 and Verbeek 1993*, which was later supported by *McNeil 2016*. The results of these studies demonstrated how the tailings water and pollution was indeed impacting negatively on aquatic ecosystems and fish populations, undermining industry and government-sponsored findings.

Furthermore, the results in these study can clearly be traced back to the oil sands with almost certainty, due to the clear backdrop that this region provides,[556] making these findings more credible than the opinions of *CAPP* and the Albertan government. This is due to the lack of

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[552] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 3

[553] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087.

[554] Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7

[555] United Nations, (1987) Our Common Future - Brundtland Report.

[556] McLinden et al, '*Air quality over the Canadian oil sands: A first assessment using satellite observations*', (AGU Journal. 2012) 39 (4)

development pre-production, and the lack of anything in this region other than that which relates to production, suggesting any rises in emissions or pollution to water and habitats alike here can be attributed to this industry, therefore so can the resulting adverse effects on health.[557]

But what lengths is the government of Alberta going to, to protect the health and rights of the First Nation communities? This, along with international and regional environmental law will be analysed in greater detail in Chapter Four.

3.4 Summary

This chapter has discussed the impacts that the oil sand industry is having and potentially could have in the future on indigenous First Nation communities and has found the opinion to be a mixed one. Some First Nation groups have resorted to legal action to defend their constitutional rights, demonstrating clear opposition to the way their land is being used.[558] However, other groups like the Fork McKay First Nations are embracing the change and reaping the economic benefit, with virtually no unemployment and a steady yet growing economy.[559] Yet, it is accepted among the First Nations that other avenues must be pursued to ensure that the economy remains strong when the production stops.[560] This would suggest that this industry is not

[557] Ibid

[558] The Athabasca Chipewya First Nation (ACFN) challenged a proposed expansion of Shell's operations at the Jackpine Mine that would increase production at the site to 300,000 barrels per day. It would affect more than 30,000 acres of land and 13 miles of the culturally significant Muskeg River. Source: Schloredt, V 2013, 'First Nation's Constitutional Challenge', Yes!, 64, pp. 7-8, Environment Complete, EBSCOhost, viewed 16 June 2016; Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010); *Rio Tinto Alcan Inc., et al v. Carrier Sekani Tribal Council.*

[559] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Jim Boucher, chief of Fort McKay First Nation (January 2014)

[560] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Kyle Harrietha, general manager of the Fort McMurray Metis (January 2014)

providing a sustainable economy for Albertans as there is no longevity to this industry, raising the question of why this is being exploited at the detriment to the environment and health of local First Nations, when there should be an equal benefit for all.[561]

The answer always returns the same result when it comes to oil: the financial benefit is too enticing to resist and perhaps this is not incorrect. Whilst the Brundtland report stated that for effective Sustainable Development the economy, environment and society must be considered, it does not suggest that if one was at stake, the development should halt. It merely suggests that they must be considered or balanced.[562] Indeed the *NPPF* support this stating that whilst these should ideally be equal gains for all three, the other two should not impede economic growth, thus prioritising the economy.[563]

Therefore, whilst it is argued that for public participation to be effective the public should have the ability to impact upon or halt a development,[564] this could cause serious economic issues for the state.[565] This may be why, although a large portion of First Nations groups oppose the development and participate in the consultation process, they are not always being listened to.[566] Yet this undermines the whole concept and purpose of public participation, to involve the stakeholders and those affected by a development in the decision making process. Whilst the public can often let 'selfish' financial reasons creep into their decisions that may influence a

[561] National Planning Policy Framework ("NPPF") para.14
[562] United Nations, (1987) Our Common Future - Brundtland Report.
[563] National Planning Policy Framework ("NPPF") para.19
[564] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) pg 208
[565] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62
[566] Panel on Public Participation in Environmental Assessment and Decision Making, 'Public Participation in Environmental Assessment and Decision Making', (NAP, 2008) 1-322

project,[567] in the case of the oil sands the reasons behind wanting to stop the project are far from selfish.

With the land used by these communities needed for water and wildlife for hunting, fishing, trapping, gathering, harvesting and recreational uses such as bathing and cooking,[568] it is the traditional way of life that is driving these communities to oppose this industry.[569] A way of life that is enshrined under legislation and should therefore be respected.[570] It is the health of these communities that is at stake,[571] their sacred animals[572] and land itself which, instead of being available for the benefit of future generations to enjoy their traditions, it is now a jaw-dropping

[567] Burton, J. and Hubacek, K., 2007. Is small beautiful? A multicriteria assessment of small-scale energy technology application in local governments. Energy Policy, 35(12), 6402-6412; Wilkinson, S.J. Sayce, S.L. & Christensen, P.H., 'Developing Property Sustainably', (Routledge, 1st Edn, 2015) pg 34; Cochrane, Alasdair (2006) Environmental ethics. Internet Encyclopedia of Philosophy . ISSN 2161-0002; Burton, J. and Hubacek, K., 2007. Is small beautiful? A multicriteria assessment of small-scale energy technology application in local governments. Energy Policy, 35(12), 6402-6412;

[568] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1-2

[569] Press Statement: Lizzie Gunggoll, 'Standing Our Sacred Ground – First Nations, Tribal Leaders & Land Owners Send Message To Canada, Stop Tar Sands At The Source', (First Peoples Worldwide, April 2014); Bob Weber, 'Alberta failing aboriginal people in the oilsands area: Report' (The Canadian Press, Feb 2016)

[570] The Canadian Constitution Act 1982, Section 35; Treaty 8 signed on June 21, 1899, between Queen Victoria and various First Nations of the Lesser Slave Lake area

[571] Laura Westra, 'Environmental Justice and the Rights of Ecological Refugees', (Earthscan, 2009) pg 122; McLean L, Patel T. Racial and ethnic variations in the epidemiology of intrahepatic cholangiocarcinoma in the United States. Liver Int 2006; 26(9):1047-1053.

[572] Peter Lee, executive director of Global Forest Watch Canada, Source: Glick, D 2011, 'TAR SANDS TROUBLE', National Wildlife (World Edition), 50, 1, pp. 26-29, Environment Complete, EBSCOhost, viewed 15 June 2016; Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 4; Environment Canada. Scientific Review for the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada. (Ottawa: August 2008).

site[573] that is causing devastation to ecosystems and habitats,[574] leaving these communities unable to live as they once did.[575]

[573] Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. Speaker - Kyle Harrietha, general manager of the Fort McMurray Metis (January 2014)

[574] MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981; Verbeek, A. et al. In Proceedings of Oil Sands – Our Petroleum Future Conference, Edmonton, 1993; McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016;

[575] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

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Chapter Four

The Environmental Regulatory Regime

4.1 Canadian Legal System

This chapter will discuss the Canadian legal system, in order to establish whose duty it is to protect the land and rights of the people. The federal government in Canada has jurisdiction over regional, national and international matters while the provinces have jurisdiction over matters of a local or private nature as set out in the *Constitution Act 1867*.[576, 577] When it comes to the energy sector, both levels have authority requiring a balance between the federal government's authority over trade and commerce with the provinces' ownership of the resource itself. In the event of a conflict, the paramountcy principle applies giving overarching authority to the federal government.[578] Each province has authority over property and civil rights[579] and conservation and management of non-renewable natural resources within such province.[580] Further, certain provinces, including Alberta, guarantee Aboriginal Peoples rights which can result in provincial involvement if oil and gas projects impact on these rights.[581] The treaties that enshrine these rights will be discussed in further detail later in this chapter.

Whilst this is how the Canadian and Albertan legal systems work together, there is also fundamental environmental principals to which they should adhere to. The passing of the

[576] Constitution Act 1867, Section 91
[577] BLAKE, CASSELS & GRAYDON LLP, 'Overview of Environmental Regulatory Regime Related to Alberta Oil Sands Activities', (Blakes Lawyers, January 2010) pg. 2
[578] Doctrine of Paramountcy, Constitution Act 1867, Section 91
[579] Ibid, Section 92 (13)
[580] Ibid, Section 92A (1)
[581] Treaties 6, 7 and 8: First Nations of Alberta

Federal Sustainable Development Act 2008[582] showed acknowledgment and acceptance of the principle of Sustainable Development, aiming to make environmental decision-making more transparent and accountable to Parliament,[583] but how do the actions within Alberta support this principle? In order to establish the legality of this industry, this principle will be looked at in more detail.

4.2 Sustainable Development

The most widely accepted definition of Sustainable Development was set out in *'Our Common Future'* in 1987 which stated that in order to be sustainable, 'development must meet the needs of the present without compromising the ability of future generations to meet their own needs'.[584] This tends to be the more widely accepted principle of environmental law, but such a definition defies the law's inability to recognise rights for the unborn. That being said, *Edith Brown-Weiss* argued the rights of future generations are generational rights in which the interests protected do not depend upon knowing the kinds of individuals that may exist or the numbers in any given future generation.[585] Whilst it is well known that the judicial system in the UK does not consider someone's rights until they have been born, should it be possible to restrict the actions of present generations when we do not know what future generations will want and need? Furthermore, is this ethical?

[582] Federal Sustainable Development Act 2008
[583] Ibid
[584] United Nations, (1987) Our Common Future - Brundtland Report.
[585] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19)

Nonetheless, the idea of SD was recognised internationally and the four key elements are as follows:

1. The need to preserve natural resources for the benefit of future generations (inter-generational equity)
2. The aim of exploiting natural resources in a manner which is sustainable, prudent, wise or appropriate (the principle of sustainable use)
3. The equitable use of natural resources, which implies that use by one state must take account of the needs of other states (the principle of equitable use, or intra-generational equity)
4. The need to ensure that environmental considerations are integrated into economic and other development plans, programmes and projects, and that development needs are taken into account in applying environmental objectives (the principle of integration)[586]

Yet, for a principle at the heart of environmental law globally, there has been no concise definition of Sustainable Development, leaving the Brundland definition as the most widely used. But despite being the most accepted definition, it is too vague[587] to act as a working legal principle[588] and often the importance of future generations is forgotten, leaving it too ambiguous to be of practical use.[589] However, it is recognised that human society is intrinsically linked to wider ecological processes and the Earth's natural resources[590] so to be truly

[586] Philippe Sands, '*Principles of International Environmental Law*', (Cambridge University Press, 2nd Edn, 2003) pg 253
[587] Andrea Ross, 'Sustainable Development Law in the UK From rhetoric to reality?', (Earthscan, 2012) pg 3
[588] William Mark Adams, '*Green Development: Environment and Sustainability in the Third World*', (Routledge, 2nd Edn, 2001) pg 4
[589] Vincent Martinet, 'Economic Theory and Sustainable Development: What Can We Preserve for Future Generations'. (1st Edn. Routledge, 2012) pg 7
[590] French, D. '*International Law and Policy of Sustainable Development*', (Manchester University Press, 2005) pg 10

sustainable, decisions need to consider long-term consequences of human activity on the planet as a whole and on its inhabitants.[591] With remediation to the oil sands uncertain and untested,[592] and with this being one of a mere handful of reserves of its type and volume,[593] it could be argued that the long-term consequences of this industry are largely unknown and therefore cannot be considered truly sustainable under this interpretation. Therefore this industry could be considered unlawful under the principle of SD, but also under the precautionary principle due to the same unknown consequences.

4.2.1 The History of Sustainable Development

In order to establish whether or not this industry is sustainable it must first be established how the concept emerged, and intension behind it. The concept emerged in the 1960's in response to "widespread disquiet about the environmental impacts of unfettered human population growth and industrialisation",[594] sparking an environmental revolution.[595] The idea of SD originally started with complaints regarding local pollution and concerns about personal health in the 1920's,[596] but over the next decade environmentalists recognised the impending threat

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[591] Andrea Ross, 'Sustainable Development Law in the UK From rhetoric to reality?', (Earthscan, 2012) pg 3
[592] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 30th January 2016
[593] Although oil sands deposits are known to exist in many countries of the world, by far the two largest reserves are in northern Alberta and the Venezuelan Orinoco Belt, each containing comparable volumes of around two trillion barrels of oil in place. Source: J. Peter Findlay, 'The Future of the Canadian Oil Sands: Growth potential of a unique resource amidst regulation, egress, cost, and price uncertainty', (The Oxford Institute of Energy Studies, February 2016) pg 63
[594] Martin Purvis and Alan Grainge, *Exploring Sustainable Development: Geographical Perspectives,* (1st Edn. Routledge. 2013) pg 3.
[595] Ibid
[596] In the 1920s the National Consumers League uncovered the negative effects in the watch industry, as a result of the chemicals used (Pollution Issues, 'Environmental Movement' < http://www.pollutionissues.com/Ec-Fi/Environmental-Movement.html> accessed 6th November 2015), and the deaths at Gauley Bridge demonstrated the role played by industry in the health of its employees, sparking concern over the environment. Construction workers in the Hawks Nest Tunnel discovered the mineral silica and were asked to mine it for use in electro-

of resource depletion and in the 60's and 70's people became more concerned with the environment itself, creating the birth of activism. *Rachael Carsons 'Silent Spring'*[597] brought attention to the public about the harm of pesticides on the environment and wildlife, sparking the first instances of the public getting involved due to environmental concerns. *Carson* suggested that environmental problems were caused due to the complex relationship with mankind and the environment;[598] she then went on to say such problems were at a global level and not local,[599] signifying that in order to make any important environmental changes, this issue would need to be addressed at an international level. This is substantial in relation to the oil sands because not only is exploitation of these reserves creating implications for the surrounding environment and First Nations in the Alberta Province, but this in turn has a knock-on effect for the rest of Canada and the rest of the world. *Goldstein* suggests that not just for a sustainable future, but to maintain a sound natural environment and reduce climate change, we must work together with less developed countries by upholding the provisions of the *Kyoto Protocol,* stressing that international cooperation is the key to achieving this.[600] This supports *Carson's* notion that environmental issues are not just local,[601] and could also suggest that Canada, as a developed and educated western country, has a moral duty to act to reduce climate change and set an example.

processing steel. The workers were not given any masks or breathing equipment to use while mining and as a result of the exposure to silica dust, many workers developed lung disease called silicosis. Source: Martin Cherniack, 'T*he Hawk's Nest Incident'*, (Yale University Press. 1986)

[597] Rachel Carson, *'Silent Spring',* (1st Edn. Houghton Mifflin. 1962)

[598] Ibid

[599] Ibid

[600] Natalie Goldstein, '*Global Warming'*, (Infobase Publishing, 1st Edn, 2009) pg 216

[601] Rachel Carson, *'Silent Spring',* (1st Edn. Houghton Mifflin. 1962)

Further, *Carson* strongly believed that information should be accessible to the public and by having readily available information and educating the public on the effects of chemicals and emissions on human health supports the notion of transparency, one of the fundamental principles of the rule of law.[602] However this is one of the largest criticisms of not just SD but environmental law as a whole; it is anthropocentric in nature and people tend to only concern themselves in matters that affect them directly, even if they support the proposal.[603] Indeed the definition of SD would suggest this, revolving around the economic and social needs of humans at the expense of the natural resource base.[604] Whilst this demonstrates the reasons why the public may oppose a project that could render them with a financial loss, such as a decrease in property value, on the flip side, the notion of YIMBY (Yes, in my back yard!) is based on economic necessity[605] and could go as far as explaining why so many Albertans are supporting the oil sands industry. That being said, even the fear for resource depletion boils down to the human-centric paradigm, suggesting that the concern is due to rapid resource depletion and worsening ecological disorder for future generations' abilities to meet their needs, not over concerns for the environment itself.[606]

Yet the notion of preserving what we have for future generations is problematic in environmental law, and specifically for the oil sands development. This is because it is hard to gain public support for something that we cannot prove, like resource depletion for future

[602] Thomas Bingham. *The Rule of Law*. (2nd Ed. Penguin, 2010) pg. 6; A. V. Dicey. An Introduction to the study of the Law of the Constitution (6th edn. Macmillan & Co. 1902)
[603] Lisa Johnson & Frona Powell, '*Environmental Law*', (Cengage Learning, 2016) pg 172
[604] Sophia Imran, Khorshed Alam & Narelle Beaumont, 'Reinterpreting the Definition of Sustainable Development for a More Ecocentric Reorientation', (Sustainable Development, 2014) 22 (2) pg. 134-144
[605] Alexandre Kiss & Dinah Shelton, '*Manual of European Environmental Law*' () pg 39
[606] M. Shamsul Haque, '*Sustainable Development Policy and Administration*', (CRC Press, 1st Edn, 2006) pg 36

generations and economic troubles such as clean-up debt,[607] making it is easier for the local community to see the economic benefits to Canada at present. This is because often society are the forgotten pillar of Sustainable Development[608] and essentially no-one knows what will happen in the future. Therefore would it be reasonable to impose burdens on the present generation to meet indeterminate future needs?[609] Despite this argument, we have a moral responsibility to future generations as it is precisely these people who will be the chief beneficiaries.[610]

4.2.2 Intergenerational and Intragenerational Equity

The concept of SD incorporates elements of inter-generational equity and looks to the long term but with no end in sight and an inability to see into the future, we should not try to determine the requirements of a non-existent generation.[611] However, according to *Edith Brown-Weiss*, the concept of inter-generational equity should not be understood as a dogmatic requirement to predict future values, but instead as a tool to enable future generations to benefit from sufficient flexibility to provide for their own needs.[612]

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[607] Tung-Chieh Jansen Wu, 'Intergenerational and Intragenerational Equity and Transboundary Movements of Radioactive Wastes', (2002) pg 100; Nathan Lemphers, Simon Dyer & Jennifer Grant, 'Toxic Liability: How Albertans Could End Up Paying For Oil Sands Mine Reclamation, (Oil Sands Fever Series, September 2010) <https://www.pembina.org/reports/toxic-liability-report.pdf> accessed 18th January 2016

[608] Jessica Chapman, 'Social Equity: The Forgotten Leg of Sustainability', (Sustainable City Network: 2014) < http://www.sustainablecitynetwork.com/topic_channels/policy/article_608299f0-8eb5-11e3-9837-0017a43b2370.html> accessed 21st June 2016

[609] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 19-26

[610] Charles J. Kibert, Leslie Thiele, Anna Peterson & Martha Monroe, 'The Ethics of Sustainability', (2011) Chapter 4.

[611] Sharon Beder, 'Costing the Earth: Equity, Sustainable Development and Environmental Economics', (*New Zealand Journal of Environmental Law*, 4, 2000) pp. 227-243.

[612] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 19-26

Indeed the decisions we make today will affect the lives of billions of future human beings. Every discovery and innovation is a gift and a legacy for future generations but we do not only provide benefits, we also provide burdens:[613]

> *"Every non-renewable natural resource that we consume leaves less for them. Every pound of carbon dioxide that we emit into the atmosphere contributes to the warming of a planet they will inherit. Every species we cause to go extinct they will never know, except as a loss. If we weigh the moral significance of an action by the number of people it potentially affects, then the impact of our actions on future generations ought to be of paramount concern. This is the realm of intergenerational justice, and it sits at the core of any ethics of sustainability."*[614]

Therefore, to ensure we do not leave an unfixable burden in Alberta for future generations, and in order to achieve ecological sustainability, we need to respect the Earth's limits and adopt this notion as a legal principle at the core of our environmental decision making.[615] However, the future generations seem to be an afterthought in Alberta, with the economy at the forefront of national and regional concerns.

As with any finite resource, depletion will deprive future generations of the important benefits as well as the resource itself, thus there is a moral obligation to conserve these resources.[616] Therefore the intergenerational effect is two-fold: On one hand there could be an irreparable environment, damaged or destroyed ecosystems and clean-up costs left to future generations,

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[613] Charles J. Kibert, Leslie Thiele, Anna Peterson & Martha Monroe, 'The Ethics of Sustainability', (2011) Chapter 4.
[614] Ibid
[615] Andrea Ross, 'Sustainable Development Law in the UK From rhetoric to reality?', (Earthscan, 2012) pg 4
[616] John L. Renne, 'Transport Beyond Oil: Policy Choices for a Multimodal Future', (Island Press. 2013) pg 62

with the burden on them to fix the damage caused by the oil industry, yet also the benefit would be gone for these generations, leaving them with nothing but the negative aftermath.

This starkly contrasts with Principle 1 of the *Stockholm Declaration* which states "man bears a solemn responsibility to protect and improve the environment for present and future generations."[617] The *Stockholm Declaration* was the first instance to link the present to the future, and under which it was recognised as international environmental policy that there should be a right to a healthy environment, but also that that there is a right to preserve the environment for future generations. Critics therefore argue the failure to control emissions has in turn failed Albertans, future generations and the global community.[618] Yet the *Stockholm Declaration* did not go as far as to impose any restrictions, leaving a rather soft approach in terms of enforceability. Whilst addressing the issue of the environment and future generations, it left it up to the States to deal with the growing problem of environmental degradation as a result of development throughout the world. Yet this was the starting point and in 1992, in Rio de Janeiro, Brazil, the conference led to an explosion of international activity and environmental conventions,[619] promoting SD and the equitable sharing of the earth's benefits.[620]

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[617] Declaration of the United Nations Conference on the Human Environment, G.A. Res. 2997, princ. 21, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (June 16, 1972) ("Stockholm Declaration"), Principle 1

[618] Reynolds, Marlo, Pembina Institute, Oil Sands Colsultations: Written Submissions (Edmonton, September 2006); Debra J. Davidson, Mike Gismondi, 'Challenging Legitimacy at the Precipice of Energy Calamity' (Springer, 2011) pg 138

[619] These include the Convention on Climate Change, the Convention on Biodiversity and the Convention on the Elimination of Persistent Organic Pollutants. Source: The Human Right to Water and Indigenous Peoples Submission to the United Nations High Commissioner on Human Rights by the International Indian Treaty Council, NGO in Special Consultative Status to the UN Economic and Social Council (April 13, 2007)

[620] The United Nations Framework Convention on Climate Change (UNFCCC), Rio de Janeiro, 3 to 14 June 1992, then entered into force on 21 March 1994, Principle 3

Nevertheless, some argue that future generations should not be represented in decisions regarding climate change. According to deliberative democracy all those potentially affected by a decision should have the opportunity to participate and debate the decision, however in relation to climate change the future generations that will be most affected by the decision cannot speak for themselves.[621] Whilst it is difficult to ascertain what the future generations want and need, the literal definition of the principle suggests trying to understand and give people of both present and future generations what they need to enjoy full and healthy lives. Equity is an ethical term relating to ones perceived thoughts of justness and fairness, unlike equality which involves a more measurable quantifiable amount.[622] Therefore, under the principle of intergenerational equity, which is inextricably linked to that of sustainable development, the wants of future generations must be considered if they are likely to be affected by a decision in order to achieve a fair and just conclusion.

Indeed the core of this theory posits that states must preserve the environmental capital they hold in trust for future generations and ensure that it is transmitted in conditions equivalent to those in which it was received. Therefore environmental preservation is necessary to ensure equity between generations; without it, the 'sustainability' of development cannot be ensured.[623] This means that Alberta is therefore responsible for preserving their 'capital', in this case the oil from the sands', not only to preserve the environment, but to keep the resources in trust for the future generations. Whilst the intragenerational 'development' aspect could be

[621] Bernice Bovenkerk, 'Public deliberation and the inclusion of future generations', Juris. 2015, 6(3), 496-515.
[622] Bronfenbrenner, M. 'Equality and equity', (The ANNALS of the American Academy of Political and Social Science, 1973) 409 (1), pg. 9-23.
[623] Virginie Barral, 'Sustainable development in international law: nature and operation of an evolutive legal norm', E.J.I.L. 2012, 23 (2), 381

seen to be met in Alberta, with the resource being spread globally and without both aspects integrated, this industry cannot be considered legally sustainable under the most widely accepted Brundtland definition, as the 'sustainability' elements are not met. But there is an important balance to be struck. Not only do we, as the human species, hold the earth as a trust for future generations, we are also beneficiaries ourselves.[624] Therefore imposing 'dogmatic restrictions'[625] on the present generation, who are also equal beneficiaries, would also not be fair. The obligations on the present generation links to the rights of the future generations, so each should use the natural system to improve the human condition. If one generation severely degrades the environment, it violates its intergenerational obligations to care for the natural system.

However, these principles when looking at the oil sands seem to consider this finite resource as the property of the people as opposed to the property of the Earth itself. The concept of Earth Jurisprudence or 'wild law' would see the way we looked at the oil sands shift from an anthropocentric approach such as that of equity, and who deserves a share of the property, to an Earth-centric approach, thus seeing the people and resources of the planet and a communion of subjects instead of a collection of objects.[626]

4.2.3 Ethics, Wild Law and Ecocide

Earth jurisprudence denotes that species, humans, resources, and natural systems are 'subjects' that have rights originating from the fact they have co-evolved as part of the Earths system.[627]

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[624] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 20
[625] Ibid
[626] Thomas Berry, *'The Universe Story'*, (HarperCollins: Reprint edition, 1994) pg 243
[627] Cormac Cullinan, 'Taking Climate Change Seriously', (2008) 20 ELM, pg 61

This 'holon'[628] notion suggests that in order to establish successful governance of the Earth's resources, our laws must be in alignment with nature's laws; this is known as 'wild law'.[629] Therefore, our laws should follow, not oppose the laws of life.[630]

At present, there is very few enforceable regimes in place for humans to protect the rights of the Earth, and there is nothing in place which prohibits humans from damaging the climate system.[631] Whilst *Kyoto* attempted to address this, this needs to be a global commitment to protect the Earth Community rather than a local or regional one. There are currently a number of international treaties and provisions which touch upon climate change, perhaps less is more in this situation. *Cullinan* argues that responding effectively to climate change requires a simplification and consolidation of the legal system, suggesting a need for new laws that are orientated towards commitment to the community of life as a whole.[632] When this gap has been filled, symptoms such as climate change will begin to disappear.[633]

Within Alberta, recent changes have been made to the regulatory bodies of the oil sands which appear in line with *Cullinan's* simplification suggestion. Indeed, the previous regulatory bodies (ERCB, AENV, AEP) have now been consolidated into the Alberta Energy Regulator (AER) with the aim to consolidate and centralise governance of this resource. However, the regulation of this resource needs to be a global concern under the notions of Earth Jurisprudence and Intra-generational Equity. Thus, international governance is lacking with only soft principles and

[628] Holon, meaning whole, was established by Arthur Koestler, '*The Ghost in the Machine'*, (Penguin, 1967) pg 48
[629] Cormac Cullinan, 'Taking Climate Change Seriously', (2008) 20 ELM, pg 61
[630] Nancy Jack Todd & John Todd, 'From Eco-Cities to Living Machines. Principles of Ecological Design', (North Atlantic Books, 1993)
[631] Cormac Cullinan, 'Taking Climate Change Seriously', (2008) 20 ELM, pg 61
[632] Ibid
[633] Ibid

provisions regulating this industry and until this is rectified with legally enforceable principles in place, there is no accountability and in turn no change will be seen.

The depletion of the oil sands and the negative effects on the environment, habitats and human health cannot be seen as in line with the Earth's Community or respectful to the 'rights' of the Earth itself. However, at present the rights of the Earth are not recognised. But that is not to say that that will always be the case. Indeed humans were once considered property, much like the Earth is now, and the killing of slaves was seen as a matter of property law as opposed to human rights,[634] but time and attitudes adapt.

Contemporary thinkers have started to question 'what the world would look like if nature had rights?'[635] In *Sierra Club v Morton*[636] this was called into question, resulting in the cancellation of a project proposed by *Disney*. Whilst this was not directly the reason why the project was cancelled, the possibility of suing on behalf of the trees signifies change. This decision has highlighted the influence of *Stones* question on nature's legal standing and has become a thing of legend,[637] demonstrating how attitudes are changing, as is the once archaic legal system. *Douglas J* in his dissenting opinion stated:

> *"The critical question of "standing" would be simplified and also put neatly in focus if we fashioned a federal rule that allowed environmental issues to be litigated before federal agencies or federal courts in the name of the inanimate object about to be despoiled, defaced, or invaded by roads and bulldozers and where injury is the*

[634] Aldo Leopold, 'The Land Ethic', (1949) 237
[635] Christopher D. Stone, 'Should Trees Have Standing – Toward Legal Rights For Natural Objects'
[636] Sierra Club v Morton 403 U.S. 727 (1972)
[637] Peter Burdon, ' The Rights of Nature: Reconsidered', Australian Humanities Review (89) 70

> *subject of public outrage… Inanimate objects are sometimes parties in litigation. A ship has a legal personality, a fiction found useful for maritime purposes. The corporation sole - a creature of ecclesiastical law - is an acceptable adversary… So it should be as respects valleys, alpine meadows, rivers, lakes, estuaries, beaches, ridges, groves of trees, swampland, or even air that feels the destructive pressures of modern technology and modern life."*[638]

This opinion would see environmentalists able to represent the rights of the land and boreal forest in Alberta for a number of reasons given by *Douglas J*, but this does not have any legal standing, especially when the economic benefit is so high. Furthermore, certainly not everyone was and is ready to accept *Stone* and *Douglas J's* opinion. *John Naff* commented on the outcome of the *Sierra Club* decision with a satirical verse suggesting that the legal system was not yet ready to extend the notion of 'rights' to nature, but since the 70's there has been an 'Earth Law' shift. This movement has seen the rights of the Earth questioned, with suggestions that producing high CO_2 emissions could be considered a crime against peace in the International Criminal Court, under the notion of ecocide.[639]

Broadly defined, ecocide is the significant damage to or destruction of an ecosystem to such an extent that peaceful enjoyment of a part of the planet will be substantially diminished.[640] Whilst there is no consensus on the exact definition of ecocide and the meaning of peaceful enjoyment and size of the damage and territory, this tends to be the most widely accepted working

[638] Sierra Club v Morton 403 U.S. 727 (1972) per Douglas J
[639] Polly Higgins, 'Rome Statute', (Eradicating Ecocide: 2010-2015) <http://eradicatingecocide.com/the-law/rome-statute/> last accessed 9 September 2016.
[640] Sailesh Mehta and Prisca Merz, 'Ecocide - a new crime against peace?' Env. L. Rev. 2015, 17 (1) 3

definition.[641] Whilst this is not yet recognised as a crime, the further we shift towards recognising the rights of the planet, the more likely this it to become a reality. The International Criminal Court (ICC) was set up in 2002 to try cases alleging crimes against peace: genocide, war crimes, crimes of aggression and crimes against humanity yet there are calls to recognise a fifth crime against peace, and that is ecocide.[642]

In 2010 *Higgins* proposed an amendment to the *Rome Statute*[643] to the UN Law Commission to include a law of Ecocide, setting a framework of intervention to stop dangerous industrial activity that causes an increase in carbon dioxide emissions and destruction of ecosystems.[644] The Canadian oil sands have been labelled the biggest example of manmade ecocide,[645] raising further questions about not just the morality of this industry, but also the legality, but what is the current position on this controversial concept?

A draft Ecocide Convention was published in the 70's calling for ecocide to be recognised as an intentional war and peace crime,[646] sparking discussions to expand the 1948 *Genocide Convention*,[647] which would include the recognition of ecocide as a stand-alone crime, a crime against humanity or a war crime.[648] The decision was taken to remove this crime from the draft

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[641] Ibid
[642] Polly Higgins, 'Rome Statute', (Eradicating Ecocide: 2010-2015) <http://eradicatingecocide.com/the-law/rome-statute/> last accessed 9 September 2016.
[643] UN General Assembly, *Rome Statute of the International Criminal* Court (last amended 2010), 17 July 1998, ISBN No. 92-9227-227-6
[644] Ibid
[645] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012)
[646] R.A. Falk, 'Environmental Warfare and Ecocide - Facts, Appraisal, and Proposals' (1973) 4 Security Dialogue 80-96.
[647] UN General Assembly, *Convention on the Prevention and Punishment of the Crime of Genocide*, 9 December 1948, United Nations, Treaty Series, vol. 78, p. 277
[648] A. Gauger, M.P. Rabatel-Fernel, L. Kulbicki, D. Short and P. Higgins (2012) 'Ecocide is the Missing Fifth Crime Against Peace, Human Rights Consortium', School of Advanced Study, University of London. Available at: http://sas-space.sas.ac.uk/4686/. Last accessed 6 April 2014.

Rome Statute due to reasons unknown, but some suggest that nuclear arms played a key role in the minds of those who opted for the final text.[649] If this matter was to be debated in the present day, the political and scientific arguments in favour of the inclusion of ecocide are stronger than ever,[650] yet that is not to say this would be accepted or even if this is viable in today's society. Yet, with huge examples of ecocide happening in Canada at the moment,[651] it is clear something must be done.

With the oil sands leaving behind defective and destructive natural ecosystems[652] on such a scale, if ecocide were to be reconsidered a crime against peace, it would most likely fall under the definition of 'significant damage to or destruction of an ecosystem' thus potentially making the decision-makers or the province itself accountable. Further, *Higgins* goes on to develop the notion of ecocide as:

> *"Extensive damage to, destruction of or loss of ecosystem(s) of a given territory […] to such an extent that peaceful enjoyment by the inhabitants of that territory has been or will be severely diminished."*[653]

Under this definition it could also be interpreted as two-fold. On the one hand the ecosystems have suffered significant damage as a result from tailings ponds and habitat destruction but on the other, the First Nations have lost the 'peaceful enjoyment' of their land and traditional ways, demonstrating another potential avenue for this argument should the position on ecocide be

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[649] C. Tomuschat, 'Crimes Against the Environment' (1996) 26(6) Environmental Policy and Law 243.
[650] Sailesh Mehta and Prisca Merz, 'Ecocide - a new crime against peace?' Env. L. Rev. 2015, 17 (1) 4
[651] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012)
[652] ITF, 'DIRTY OIL: ALBERTA'S TAR SANDS', (INTERNATIONALTREEFOUNDATION.ORG, Sep 2015) pg. 13
[653] P. Higgins, 'Eradicating Ecocide Global Initiative: What is Ecocide?' (2014). Available at: http://eradicatingecocide.com/overview/what-is-ecocide/. Last accessed 6 April 2014

re-evaluated. The arguments supporting *Higgins'* campaign suggest that the result of the loss or destruction of an ecosystem can lead to:

- breaches of human rights;
- heightened risk of conflict;
- diminution in the quality of life to all inhabitants of a given territory and of territories further afield;
- diminution in the health and well-being to inhabitants, arising out of or leading to catastrophic disaster, food poverty, water pollution and shortages and unnatural climate change.[654]

If these were indeed grounds to consider ecocide a crime then perhaps the oil sand industry would be the perfect case study, demonstrating numerous human rights violations and treaty violations within the First Nations communities, the absolution of traditional ways of life,[655] an influx of reported health problems linked to hydrocarbon emissions,[656] land, food and water pollution,[657] and finally the correlation between the emissions from the industry and the link to

[654] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 7
[655] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)
[656] Gina Solomon, 'The Other Oil Disaster: Cancer and Canada's Tar Sands', (Opinion-editorial, Natural Resources Defense Council, May 3, 2010) < http://switchboard.nrdc.org/blogs/gsolomon/the_other_oil_disaster_cancer.html> accessed 15th June 2016
[657] Research suggests that the gas emissions have indeed has a negative impact on human health. Source: Howell, S.G., Clarke, A.D., Freitag, S., McNaughton, C.S., Kapustin, V., Brekovskikh, V., Jimenez, J.L. and Cubison, M.J., 2014. An airborne assessment of atmospheric particulate emissions from the processing of Athabasca oil sands. Atmospheric Chemistry and Physics, 14(10), pp.5073-5087; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7; and on water ecosystems and equatic life. Source: Gosselin, P., Hrudey. S. E., Naeth, M. A., Plourde, A., Therrien, R., Van Der Kraak, G., and Xu, Z. (2010). The Royal Society of Canada Expert Panel: Environmental and Health Impact of Canada's Oil Sands Industry. The Royal Society of Canada; MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981; Verbeek, A. et al. In Proceedings of Oil Sands – Our Petroleum Future Conference, Edmonton, 1993.

climate change.[658] The effect of the criminalisation of ecocide would then see a very important shift, from 'polluter pays' to 'polluter no longer pollutes',[659] which naturally would be much more effective in serving its purpose. This would see those who would pollute regardless for the sake of the profits, despite knowing that they would face a hefty fine, made accountable for their actions. By creating clear and concise legally binding duties and responsibilities, this would aid in creating a transparent legal framework for decision makers to understand the rights and wrongs. This is therefore a pre-emptive, preventative and post-operative 'think before you act' law, allowing for action to be taking before the damage is done.[660] This shift towards a precautionary approach allows for intervention if there is a foreseeable risk, making a much more proactive foundation for international law as opposed to waiting for something to go wrong and then punishing for it. This approach would begin to fix the issue at the core.

Whilst this could raise questions on the transparency and fairness of retrospective law, other crimes against peace have resolved that there is a moral code that goes above all men. Indeed during the Nuremberg trials, the main defence of the Nazi's relied on the rule of law, that 'no man can be punished or lawfully interfered with except for breaches of the law'.[661] Yet *Dworkin's* theory of natural law was relied on in order to establish a breach of this higher moral code, the idea of inherent and reasonably knowable right and wrongs that society must live by in order to function.[662] In the case of Nuremberg this was in relation to genocide and war crimes, in the case of the oil sands these moral wrongs would be ecocide, irreversible mass destruction to natural

[658] Environment Canada, Annual Regional Temperature Departures, (Environment Canada, 2nd April 2012)
[659] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8
[660] Ibid
[661] Dicey, *'The Law of the Constitution'* (10th ed, 1959)
[662] Ronald Dworkin, '*Taking Rights Seriously*', (Paperback edn. Harvard University Press, 1977)

and essential ecosystems, treaty and human rights violations and consequences for future generations.

If ecocide were to be added to the *Rome Statute*, which Canada has already ratified, a case could be raised to the ICC by either the UN, a member state, a prosecutor of the ICC or by an individual writing to the ICC.[663] This would hold Canada accountable for their actions.[664] However, perhaps best practise would be to impose liability on the individual as opposed to the state or a corporation, to act as a deterrent. This would indeed be in line with the Canadian justice system.

4.2.4 Accountability and Deterrence

The traditional model of Canadian criminal justice is a state centred one intended to punish, deter and/or rehabilitate,[665] therefore more proactive than the UK's justice system, which focuses more on making amends after offending in a bid to break the cycle of crime.[666] However, this proactive, preventative method in Canada does not seem to echo in environmental legislation, which appears to be reactive, after the fact. Issuing penalties still allows damage to the environment to occur, therefore for environmental legislation to be effective there needs to be a stronger model. There needs to be accountability to dissuade individuals or corporations from damaging the environment in the first place. Whilst Polly Higgins' notion of ecocide would provide such a remedy for mass ecosystem degradation, what about on a smaller scale?

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[663] Polly Higgins, 'Earth Is Our Business: extract', (The Gaurdian, 2012) <https://www.theguardian.com/law/2012/jun/04/ecocide-earth-business-extract> accessed 29th January 2017

[664] Ibid

[665] Bruce P. Archibald, 'Criminal Justice Models: Canadian Experience in European and Islamic Comparative Perspective' (April 11, 2016). <https://ssrn.com/abstract=2763012> accessed 7th July 2017

[666] 'Law and the justice system', (Gov.UK) <https://www.gov.uk/government/topics/law-and-the-justice-system> accessed 7th July 2017

Currently, the model in Canada would find the corporations at fault for the failure to consult and other legal breaches, however this is largely ineffective as the financial penalties imposed are small compared to the profits. Of course an injunction could then prohibit certain actions or behaviours, but what if this too is ignored? Who would be at fault then? It is very easy for individuals to hide behind their corporation and corporate liability insurance without being branded a criminal, however the average person would not want a criminal record of their own. Therefore making individuals accountable would be a more effective form of deterrence when it comes to environmental law, and more in line with the rule of law itself. This would fall under 'general deterrence', which seek to prevent crimes that have not happened yet, by making an example of certain individuals who have broken the law. This would certainly be the most applicable model of deterrence for environmental law to achieve its intention.[667]

Thomas Hobbes argued punishment for crimes must be greater than the benefit that comes from committing the crime,[668] which is why the current model of environmental law is ineffective, the benefits outweigh the punishment because the punishment is not felt at an individual level. An approach similar to that in *Donoghue v Stevenson*[669] may therefore provide a means of establishing individual accountability through tort law, providing a duty of care to protect the current and future generations from the harm caused by emissions, pollution and environmental risk. And indeed the Canadian Supreme Court is shaping tort law throughout Canada, aiming to create 'a disincentive to risk-creating behaviour'.[670] A book entitled '*Climate*

[667] Compared with 'specific deterrence' which aims to only punish the offender and deter them from committing that offence again. Source: T. Hobbes, '*Early Classical Philosophers Of Deterrence Theory*', (Criminology) 41, pg 233-234.

[668]

[669] Donoghue v Stevenson [1932] UKHL 100

[670] Resurface Corp v Hanke [2007] 1 S.C.R. 333, para 6

Change Liability' argues that in light of the above statement from the Supreme Court, climate change tort litigation actions could be brought in negligence or strict liability against oil sands developers by First Nation groups if climate change is not adequately regulated.[671]

4.3 Canadian Legislation

Legal principles only go so far. Whilst on paper the idea of ecocide is a great notion and a step towards altering perceptions of the environment,[672] as is sustainable development and intergenerational equity, the reality of environmental protection and preservation relies on international, national and provincial laws. Perhaps these laws need to be consolidated into clear, concise and modern laws, to incorporate an element of individual accountability, criminalising the actions of the individual, or imposing injunctions to prevent certain offences.

4.3.1 International Legislation

The international legislation governing the oil sands industry mostly takes the form of treaties, which Canada enters in to willingly by signing up to and then ratifying, at which point becoming accountable to the treaty.[673] Indeed the *United Nations Convention on Biological Diversity*[674] was adopted during the Earth Summit in Rio in response to increased concern about sustainability

[671] Richard Lord, Silke Goldberg, Lavanya Rajamani & Jutta Brunnee, 'Climate Change Liability: Transnational Law and Practice', (Cambridge University Press, 1st Edn, 2012) pg. 542
[672] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8
[673] Before the treaties can be incorporated into Canadian legislation they must be incorporated into federal legislation before treaty obligations can be met at the domestic level and if the treaty pertains to matters dealt with at the provincial level then the treaty must also be incorporated into provincial legislation. Source: E. F. Carasco, ' The Canadian Encyclopedia: Treaty-Making Power', (2007) <http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA0008110> accessed 18 September 2016
[674] United Nation Convention On Biological Diversity (CBD) 1992

and the importance of biological diversity. Diversity in the oil sands region is important to the sustainability of the surrounding environments ecosystems, so this treaty aims to promote:

> *"the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources […]".*[675]

This treaty focuses on the Brundtland definition of SD and intergenerational principles, and has been implemented in Canada[676] and Alberta[677] through a number of different statutes. However, as discussed in section 4.2, this industry cannot be considered to be using resources sustainably. Any exploitation of a finite resource, especially one causing depletion to such an extent and leaving behind no benefit for future generations and a clean-up cost, cannot be sustainable, it would undermine the literal definition and the Brundtland one. Sustainable and equitable use of this resource would see this oil used as an environmentally neutral small base energy load filling in for renewable energy shortfalls, ensuring it would last for many years to come.[678]

But it is not just resources that are protected under international treaties. The unregulated killing of migratory birds in the early 19th century put many species at risk throughout Canada and the United States. In 1916, recognizing that preventing further species loss would require international cooperation, Canada, the UK and the USA adopted the *Convention on the*

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[675] Ibid, Article 1
[676] Migratory Birds Convention Act (1994); Canadian Biodiversity Strategy (1995); Canadian Environmental Assessment Act (1995); Canada Oceans Act (1997); Species at Risk Act (2000)
[677] The Water Act; The Wildlife Act; Alberta Species at Risk Program; Alberta Biodiversity Monitoring Institute (*ABMI*, 2014) <http://www.abmi.ca/home.html> accessed 30th January 2016
[678] Canadians for a Sustainable Society, 'Oil Sands', (2017) < http://sustainablesociety.com/environment/oil-sands#.WH97y1OLTIU> accessed 18 January 2017

Protection of Migratory Birds,[679] creating a uniform system of protection by establishing a common closed season on the hunting of migratory game birds such as ducks and geese. Whilst the convention is outdated in its details, the core objective of protecting migratory bird species remains clear and have been implemented in Canada under *Migratory Birds Convention Act*.[680] This act was modernised in June 1994 adding regulations to protect migratory birds, their eggs, and their nests from hunting, trafficking and commercialization, requiring a permit to engage in any of these activities.

The Athabasca delta in the oil sands region is an important staging area for migratory waterfowl with more than 1 million using the delta in autumn, the use of the water and destruction and contamination of the area is causing huge risks to these birds and habitats. Whilst these waterfowl are not protected under this convention, mallards are and in April 2012 it was reported that 500 ducks had mistaken an oil sands pollutant-filled reservoir in Alberta as a safe place to land, only three birds survived but actually, an estimated 1,606 birds, mostly mallards, died as a result.[681] These are protected under the convention and the inaccurately reported figures raises serious questions. Indeed, the *Natural Resources Defence Council* explored how many birds, currently alive or yet to be born, would be lost if all the oil sands projects proposed in Alberta became reality and found an estimated maximum death toll of 166 million birds over the next 50-60 years,[682] clearly highlighting the deficiencies of *the Convention on the Protection of Migratory Birds*, and Canada's *Migratory Birds Convention Act*. Whilst the purpose is to

[679] Convention on the Protection of Migratory Birds 1916
[680] Migratory Birds Convention Act (MBCA), 1994
[681] Wordwatch Institute, 'Oil Sands Could Threaten Millions of Migratory Birds', (Wordwatch Institute: Vision for a Sustainable World, 2013) < http://www.worldwatch.org/node/6052> accessed 21 May 2016
[682] Natural Resources Defense Council (NRDC), 'Danger in the Nursery: Impact on Birds of Tar Sands Oil Development in Canada's Boreal Forest', (NRDC Report December 2008) pg iv

"implement the Convention by protecting and conserving migratory birds, as populations and individual birds and their nests", the penalties are again mostly monetary, until repeating the offence occurs. The punishment here does not seem to adhere to the purpose of the act, which is prevention and conservation of these birds, not punishment for when this is ignored. This particular incident demonstrates Canada ignoring the purpose of an international treaty to which they are signatories, defeating the objective of both the international and federal laws that are in place to protect these species, for the sake of the money derived from the oil, and yet nothing has been done to ensure this does not continue to happen. But how far is the oil sands industry going to ensure that these protected birds are safe? Well, to prevent them from landing on the polluted or destroyed areas, propane cannons go off at random intervals and scarecrows stand guard on floating barrels to scare them away.[683]

Further, the *Geneva Convention on Long-Range Transboundary Air Pollution*[684] came into force in 1983, aiming for signatories to limit and, as far as possible, gradually reduce and prevent regional and transboundary air pollution. Yet the aims of this treaty seem similar to the *Kyoto Protocol* in their intentions, aiming for a reduction in GHG emissions and further demonstrating that emissions have global consequences, not just regional ones. This notion supports the outcome in the notorious *Trail-Smelter* case,[685] prior to which disputes over transboundary air pollution had never been settled through arbitration, and the polluter pays principle had never

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[683] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016

[684] Geneva Convention on Long-Range Transboundary Air Pollution, 1983

[685] This case involved pollution originating at the Cominco Smelter in British Columbia, Canada, causing damage to farms in Steven's County, Washington, USA. The total distance between the affected farms and the Smelter was less than 30 kilometers and within this stretch lies the US/Canadian border. Source: Martijn van de Kerkhof, 'The Trail Smelter Case Re-examined: Examining the Development of National Procedural Mechanisms to Resolve a Trail Smelter Type Dispute', (Merkourios - International and European Environmental Law, 2011) 27 (73), pg 69; United States v. Canada, Arbitral Trib., 3 U.N. Rep. Int'l Arb. Awards 1905 (1941)

been applied in an international context.[686] The outcome made Canada pay monetary damages as a result of Canadian pollution to US land, establishing that polluting nations were to be held responsible for harm caused to another nation's environment. The implications of this case could see Canada having to pay damages to nations impacted by emissions stemming from the oil sands, however some disagree that this case should be a binding precedent due to the unique circumstances surrounding *Trail Smelter*.[687]

That being said, the tribunal established that a state shall not permit the use of its territory in a manner to cause injury to the territory of another,[688] coupled with the *Geneva Convention on Long-Range Transboundary Air Pollution,* this should be sufficient to establish a duty on Canada not to pollute other territories. If the *Trail Smelter* case were to be applied to the oil sands this could raise issues with monetary damages as it is hard to establish a root cause of transboundary emissions. Further to that, whilst this would support the polluter pays principle, this would undermine preventative action that a crime of ecocide would achieve by simply allowing the emissions and pollution to continue to do harm, raising concerns on the effectiveness of not just previous cases but also of what should be legally binding international treaties.

There is usually a clause incorporated in to the treaty itself which enables signatories to give notice to leave when they please. After signing up to the *Rio Declaration* in 1992[689] and then the

[686] Jaye Ellis, 'Has International Law Outgrown Trail Smelter?', (Bratspies, Rebecca and Miller, Russell edn.), Transboundary Harm in International Law: Lessons from the Trail Smelter Arbitration (2010): 133
[687] Karin Mickelson, 'Notes and Comments: Rereading Trail Smelter', (The Canadian Yearbook of International Law, 1993) pg. 224
[688] United States v. Canada, Arbitral Trib., 3 U.N. Rep. Int'l Arb. Awards 1905 (1941)
[689] The United Nations Framework Convention on Climate Change (UNFCCC), Rio de Janeiro, 3 to 14 June 1992, then entered into force on 21 March 1994

Kyoto Protocol,[690] it seemed that Canada was committed to a reduction of emissions and preservation of resources, however *Simpson et al* have highlighted how this has been completely ineffective.[691] Repeatedly missing targets has been alarming to all Canadian's who wanted to see Canada as one of the leaders in the battle against climate change, and alarming to all of those aware of the repercussions. It was these very repercussions that led to Canada withdrawing from the protocol in 2011, an act which in itself demonstrates the ineffectiveness of environmental law and international treaties.

Under Article 27, a party may withdraw from *Kyoto* at any time after three years from the date of entering into force by giving written notice,[692] demonstrating the ease at which a country can essentially opt out of international law. Whilst treaties by definition are 'hard law' because they are binding when ratified,[693] they actually could be considered soft law due to the ability to opt in or out. However some consider that the real mistake with *Kyoto* was the Canadian negotiators forcefully trying to meet or beat the American commitment[694] by agreeing to unachievable emissions targets. These unrealistic targets would have left Canada with enormous financial penalties so they chose to opt out of *Kyoto* instead. However this was not Canada's only choice. Other options such as filing formal notice and renegotiating their goals would have allowed

[690] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997
[691] Simpson et al (2007) pg 24
[692] UNFCCC (1997) Kyoto Protocol to the United Nations Framework Convention on Climate Change adopted at COP3 in Kyoto, Japan, on 11 December 1997, Article 27
[693] Alan Boyle, 'Some Reflections on the Relationship of Treaties and Soft Law'. Source: Vera Gowlland-Debbas, Hassiba Hadj-Sahraoui, Nobuo Hayashi, '*Multilateral Treaty-making: The Current Status of Challenges to and Reforms Needed in the International Legislative Process'*, (Papers presented at the Forum Geveva held in Geveva, Switzerland, Kluwer Law International, May 1998) pg 25
[694] John Ibbitson, 'Kyoto withdrawal shames us all', (The Globe and Mail, December 2013) <http://www.theglobeandmail.com/news/politics/kyoto-withdrawal-shames-us-all/article4180876/> accessed 18th September 2016

Canada to dodge the financial penalties,[695] or even the possibility of using nuclear power as an alternative,[696] but they had a choice, and they chose money from the oil sands over their commitment to climate change.

4.3.2 Federal and Provincial Legislation

Whilst this touches on international legislation regulating environmental protection in relation to the oil sands, there is a variety of key federal and provincial statutes and regulations in Alberta governing oil and gas exploitation. The *Canadian Environmental Protection Act (CEPA*)[697] is a key component of the environmental legislative framework in Canada, which "respects pollution prevention and the protection of the environment and human health in order to contribute to sustainable development".[698] The guiding principles of this act seem to adhere to key principles of environmental law,[699] including SD, inter and intra-generational equity, polluter pays and pollution prevention. However the reality is very different and lax regulations have paved way for rapid expansion of the sector with large profits to be made,[700] with federal acts such as *CEPA* and the *Fisheries Act*[701] failing to regulate harmful toxins, with no action being taken to rectify this. *Higgins* argues that whilst studies have shown contamination, damage and destruction, few

[695] Sarah Laskow, 'Why is Canada withdrawing from Kyoto? Two words: Tar sands', (Grist, December 2011) <http://grist.org/article/2011-12-13-why-is-canada-withdrawing-from-kyoto-two-words-tar-sands/> accessed 18th September 2016
[696] Duane Bratt, ' Implementing Kyoto In Canada: The Role of Nuclear Power', The Energy Journal, 26 (1) pg 108
[697] Canadian Environmental Protection Act (CEPA) (1999)
[698] Environment Canada. 2006a. Canadian Environmental Protection Act (CEPA 1999). <http://www.ec.gc.ca/CEPARegis,try/the_act/> accessed 25 September 2016
[699] The guiding principles of CEPA are: Sustainable Development; Pollution Prevention; Virtual Elimination; Ecosystem Approach; Precautionary Principle; Intergovernmental Cooperation; National Standards; Polluter Pays Principle; Science-based Decision Making
[700] Polly Higgins, 'Earth Is Our Business: Changing the Rules of the Game', (Shepheard-Walwyn Publishers Ltd, 2012)
[701] Fisheries Act (1985)

legally binding standards have been imposed nor implemented in this sector,[702] highlighting the lack of concern for these breaches and gaps in the law.

However the *Environmental Protection and Enhancement Act* aims to support and promote the protection, enhancement and wise use of the environment through sustainable development, with respect to environmental impact assessments, the release and storage of hazardous substances and the remediation of contaminated lands.[703] This act aims to support the goals of Sustainable Development[704] whilst integrating environmental protection and economic decision making.[705] In principle, this act prohibits anyone from carrying out activities that may impact the environment in Alberta unless they obtain approval, imposing heavy fines for non-compliance, including the possibility of a $1 million fine and up to two years imprisonment.[706] However, whilst the purpose of this act is clear, in practise it is outdated and too broad to "support and promote protection, enhancement and wise use of the environment."[707, 708] This act applies to a wide range of environmental areas, not specifically the oil sands, therefore watering down the importance of this area. As the biggest polluter in Alberta, this act is far too outdated and broad to govern this industry.[709] Further, whilst this imposes fines on the polluter, this also bears similar deficiencies to the above mentioned treaties, providing penalties instead of prevention.

[702] Polly Higgins, 'Earth Is Our Business: Changing the Rules of the Game', (Shepheard-Walwyn Publishers Ltd, 2012)
[703] Environmental Protection and Enhancement Act (R.S.A. 2000, c. E-12) (EPEA)
[704] Ibid, Section 40 (a)
[705] Ibid, Section 40 (b)
[706] Ibid
[707] Andrea Olive, 'The Canadian Environment in Political Context' (University of Toronto Press, 2016) pg 137
[708] Environmental Protection and Enhancement Act (R.S.A. 2000, c. E-12), Section 2
[709] Andrea Olive, 'The Canadian Environment in Political Context' (University of Toronto Press, 2016) pg 137

The Oil and Gas Conservation Act[710] sets out rules intended to prevent oil and gas waste, providing for the economic, orderly and efficient development of oil and gas through licensing and approval requirements for drilling and operating facilities and the regulation of oil field and pool developments. This act intends to conserve resources to maximize the benefit for all Albertans and to control pollution,[711] demonstrating commitment to intergenerational equity and reduce emissions whilst ensuring an economic benefit is seen, thus supporting the notion put forward in the Brundtland report.[712] Further, *the Oil Sands Conservation Act*[713] has a similar purpose and effect to the above mentioned act, but applies directly to the oil sands, thus demonstrating provincial commitment to SD by creating a regulatory framework under which specifically this industry must adhere to. This act permits that the Regulator, with the approval of the Minister of Environment and Sustainable Resource Development, may make rules prescribing the measures to be taken to control pollution.

Whilst naturally there are a variety of other statutes loosely related to the industry, the key ones have been discussed above with the majority proving somewhat ineffective. *Higgins* suggests there are two options: voluntary initiatives and mandatory laws. The voluntary schemes would include trading mechanisms such as *Reducing Emissions from deforestation and Forest Degradation (REDD)* or voluntary contributions, such as the *Yasuni Ishpingo Tambococha Tiputini (Yasuni ITT) Inititative*. However, whilst these voluntary agreements show progressive thinking and a willingness to consider the environment above the financial benefit, they do not

[710] The Oil and Gas Conservation Act (2000), (R.S.A. 2000, chapter O-6) (OGCA)
[711] BLAKE, CASSELS & GRAYDON LLP, 'Overview of Environmental Regulatory Regime Related to Alberta Oil Sands Activities', (Blakes Lawyers, January 2010) pg. 3
[712] United Nations, (1987) Our Common Future - Brundtland Report.
[713] Oil Sands Conservation Act (R.S.A. 2000, c. 0-7) (OSCA)

have the legal enforceability that mandatory laws do. This is why, although the *Yasuni initiative* was hailed as one of the world's most innovative conservation proposals, in August 2013 President Correa withdrew the proposal saying the pledges received from countries were too minimal, stating Ecuador had been failed by the international community and in 2016 the first 200 wells were drilled. The opposing 'mandatory law' method would see sanctions imposed depending on the severity of the act. These can be the most effective means to prevent certain behaviours due to fear of sanctions and the stigma attached to breaking the law. However, in the case of the oil sands, the fear is not great enough as the sanctions and punishments seem non-existent at an individual level. If the global community aligned their priorities then perhaps voluntary initiatives would be more successful, after all it was due to lack of global contributions that the *Yasuni initiative* failed. Indeed if attitudes shifted to an Earth-centric approach and considered this a matter for the 'Earth community' to get involved with, the outcome would have been different and the beautiful *Yasuni National Park* would not be set to face the same fate as the boreal forest.

4.3.3 Treaty Violations and Human Rights

Whilst health and social concerns of the indigenous communities have been discussed at length in Chapter Three, another major concern is the legality of the oil sands in light of 'The Numbered Treaties', and concerns regarding human rights. There have been numerous treaty violations, with the main areas of concern focusing on Aboriginal Treaties 6,[714] 8[715] and 11[716] which ensure lands of First Nations not be taken away by large and uncontrolled development that may

[714] Treaty 6
[715] Treaty 8 signed on June 21, 1899, between Queen Victoria and various First Nations of the Lesser Slave Lake area
[716] Treaty 11 signed between 1921 and 1922, between King George V and various First Nation band governments in what is today the Northwest Territories

threaten their culture and traditional way of life. Yet, despite the constitutionally protected rights given to these people, the de-watering of rivers and streams and the destruction of the boreal forest has threatened the cultural survival of the First Nations peoples,[717] leading to residents and communities questioning the legality of this industry once again.[718]

Between 1871 and 1921, the Crown entered into 'The Numbered Treaties' with various First Nations that enabled the Canadian government to actively pursue agriculture, settlement and resource development of the Canadian West and the North.[719] Under these treaties, the First Nations who occupied these territories gave up large areas of land to the Crown and in exchange, the treaties provided for such things as reserve lands, farm equipment and animals, annual payments, ammunition, clothing and certain rights to hunt and fish.[720] These will now be discussed in more detail.

Aboriginal Treaty 6

Treaty 6 intended to serve as the united political voice for those First Nation signatories, ensuring protection of treaty rights and human rights of the First Nations, including both the right to choose their own governmental and political structures, and to direct the social, cultural, spiritual and economic advancement of their peoples. The Confederacy of Treaty Six First

[717] Clayton Thomas-Muller (of the Mathais Colomb Cree Nation), 'We Speak for Ourselves' (Oil Sands Truth: Shut Down the Tar Sans) < http://oilsandstruth.org/we-speak-ourselves> accessed 26th September 2016
[718] Kristin Moe, 'Alberta Tar Sands Illegal under Treaty 8, First Nations Charge' (Yes! Magazine: 2012) <http://www.yesmagazine.org/planet/alberta-tar-sands-illegal-treaty-8-first-nations-shell-oil> accessed 26th September 2016
[719] Because they are numbered 1 to 11, the treaties are often referred to as the "Numbered Treaties." Source: Government of Canada, 'Treaties with Aboriginal people in Canada', (Government of Canada: 2010) <http://www.aadnc-aandc.gc.ca/eng/1100100032291/1100100032292> accessed 27 September 2016
[720] Ibid

Nations is dedicated to ensuring that the terms, spirit and intent of this treaty are honoured and respected.[721]

In May 2008 the Beaver Lake Cree used their rights guaranteed under treaty 6 to take the governments in Canada and Alberta to court. The treaty, established in 1876, guaranteed that "as long as the sun shines, the grass grows and the rivers flow we can continue our traditional way of life", containing provisions which required the Aboriginal Peoples to surrender land rights in exchange for government assistance in the form of farm equipment, reserve lands and annual payments.[722] Additionally, the Treaty stated First Nations "shall have [the] right to pursue their avocations of hunting and fishing",[723] respecting their traditional ways, however this is not without limitations. The treaty states that exclusions may be made for land "required or taken up for settlement, mining, lumbering or other purposes", providing a clause to deviate from the rights granted to First Nations under this treaty when oil is involved. Despite this, in April 2013 the Alberta Court of Appeal ruled in favour of the Beaver Lake Cree,[724] permitting them to go to trial over the oil sand dispute.

Currently, approximately 300 projects are underway in the territory covered by Treaty 6,[725] with almost 30% of the oil sands' daily total produced on the Beaver Lake Cree's territory.[726] Whilst

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[721] The Confederacy of Treaty Six First Nations, 'Welcome to Treaty 6 First Nations' (TreatySix.Org) <http://www.treatysix.org/> accessed 27 September 2016

[722] Treaty 6, 'The Encyclopedia of Saskatchewan', <http://esask.uregina.ca/entry/treaty_6.html> accessed 27 September 2016

[723] Roger Duhamel, Copy of Treaty no. 6 between Her Majesty the Queen and the Plain and Wood Cree Indians and other tribes of Indians at Fort Carlton, Fort Pitt and Battle River with adhesions, online: AANDC-AADNC <https://www.aadnc-aandc.gc.ca/eng/1100100028710/1100100028783> accessed 27 September 2016

[724] Lameman v Alberta (AG), 2013 ABCA 148

[725] Sheila Pratt, 'Appeal court paves way for Cree nation's oilsands case to go to trial', (The Edmonton Journal: 2013) <http://www.edmontonjournal.com/business/Appeal+court+paves+Cree+nation+oilsands+case+trial/8477719/story.html>accessed 27 September 2016

[726] Ibid

the permits were granted lawfully,[727] the Beaver Lake Cree allege the combined effects of the projects limit their rights to hunt and fish as provided by treaty,[728] and specifically that the oil sands projects pollute the air and water, destroy the land, and disrupt the surrounding wildlife, thereby eliminating or greatly reducing their ability to hunt and fish.[729] This in turn prevented them from exercising their treaty rights, thus violating section 35 of the Constitution Act.[730] Of course the exclusion clause can be used to defend the actions here for 'mining', rendering the treaty ineffective.

Treaty 8 has a similar exclusion clause written in, suggesting ulterior motives were present when bringing the First Nations under treaty, and that maybe the First Nations were not aware what they were signing up to as it was not made transparent to them.

Aboriginal Treaty 8

> *"Treaty 8 surrendered 840,000 square kilometres of northern Alberta…. It was a heavy price to pay for the Crown's promise that the First Nations would retain hunting, trapping, and fishing rights in perpetuity. These rights were affirmed by the Constitution Act of 1982."*[731]

The rights provided under Treaty 8, and enshrined in domestic law under the *Constitution Act 1982*,[732] give further assurances to protect the First Nation's traditional way of life, but once

[727] Ibid
[728] Ibid
[729] Tar sands: Supporting the Beaver Lake Cree, (The Co-operative) <http://www.co-operative.coop/join-the-revolution/our-plan/clean-energy-revolution/tar-sands/supporting-the-beaver-lake-cree/> accessed 27 September 2016
[730] The Constitution Act 1982, Section 35
[731] Ibid
[732] Constitution Act of 1982, Section 35

labelled "the most important post Confederation document for First Nations",[733] how has it come to be that these rights have been forgotten?

Indeed the Blueberry River First Nations (BRFN) have commenced a treaty rights infringement claim against the province of British Columbia, alleging that the province has breached Treaty 8 obligations due to the cumulative impacts of provincially authorized industrial development in BRFN's traditional territory.[734] This treaty states First Nations retain the right to hunt and fish in their traditional homelands, but if these lands are decimated by the mining that has been granted by permit, and there are no forests, streams or animals, this contradicts the purpose of the treaty itself.[735]

A rider clause was attached to the treaty allowing the government of Alberta the right to exclude "tracts as may from time to time be required or taken up for settlement, mining, lumbering, trading or other purposes",[736] providing a loophole for exploitation of these reserves. Yet creating a legal basis for 'breaching' treaty rights in the treaty itself is counterproductive and far from transparent, suggesting this was always the intention for this land. However this has not stopped those affected from taking legal action, particularly by those from Fort Chipewyan, the first community downstream from the oil sands.

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[733] Marsden. W, 'Stupid to the last drop: How Alberta is bringing environmental armageddon to Canada (and doesn't seem to care)', (Toronto: Random House. 2008) pg 197

[734] Ratcliff & Company, 'Blueberry River First Nations File Claim Challenging Development In Northeast BC' (2015-03-03 Notice of Civil Claim: 2015) <http://www.ratcliff.com/news/blueberry-river-first-nations-file-claim-challenging-development-northeast-bc> accessed 27 September 2016

[735] Lori Lambert, 'Alberta's Oil Sands and the Rights of First Nations Peoples to Environmental Health' (Native Cases: Evergreen) pg 3

[736] Marsden. W, 'Stupid to the last drop: How Alberta is bringing environmental armageddon to Canada (and doesn't seem to care)', (Toronto: Random House. 2008) pg 197; Relates to clause in Treaty 9 signed in 1905 between the Government of Canada in the name of King Edward VII and various First Nation band governments in northern Ontario

The Athabasca Chipewyan First Nation (ACFN) challenged Shell Canada's expansion of the Jackpine tar sands mine asserting the expansion would be a further assault on their rights under Treaty 8,[737] by destroying over fifty square miles of land and mining portions of the Muskeg River, Canada's most important watershed.[738] The ACFN argued this ignored their legal duty to consult[739] as per *Haida*[740] and *Taku*,[741] in turn undermining the notion of public participation, impacting their culture and identity. Yet despite having a seemingly strong legal position, the initial court and the appeal found in favour of Shell, stating the project's likely adverse environmental effects were 'justified in the circumstances', giving no reasons for this decision.[742] This contradicts the earlier case which found in favour of the Beaver Lake Cree,[743] creating uncertainty and lack of transparency. Perhaps and answer can be found in the principle of environmental justice.[744]

This historical 'land surrender treaty' is ambiguous in terms of the rider clause, raising concerns as to when "taking up" land will amount to treaty infringement. *Grassy Narrows,*[745] despite

[737] Athabasca Chipewyan First Nation v Canada (Minister of the Environment) [2014]
[738] Kristin Moe, 'Alberta Tar Sands Illegal under Treaty 8, First Nations Charge' (Yes! Magazine: 2012) <http://www.yesmagazine.org/planet/alberta-tar-sands-illegal-treaty-8-first-nations-shell-oil> accessed 26th September 2016
[739] Ibid
[740] Haida Nation v. British Columbia (Ministry of Forests), 2004, Supreme Court of Canada 73.
[741] Taku River, Tlingit First Nation v. British Columbia, 2004, Supreme Court of Canada 74.
[742] Athabasca Chipewyan First Nation v Canada (Minister of the Environment) [2014]; Source: University of Saskatchewan, 'Athabasca Chipewyan First Nation v. Canada' (Native Law Centre: 2014) <https://www.usask.ca/nativelaw/news/2014/athabasca-chipewyan-first-nation-v.-canada1.php> accessed 26th September 2016
[743] Lameman v Alberta (AG), 2013 ABCA 148
[744] This principle suggests there is a connection between certain groups and cultures and environmental health and socio-economic conditions. Some argue that there is a reason the land being destroyed at the expense of health and the environment is aboriginal land, and this would not happen to other social groups. Source: Beverley Jacobs, 'ENVIRONMENTAL RACISM ON INDIGENOUS LANDS AND TERRITORIES', (May 2010) pg 10
[745] Grassy Narrows First Nation v Ontario (Natural Resources), 2014 SCC 48

relating to Treaty 3, held provinces' "taking up" rights are subject to certain limits and if in excess of these, this would constitute an infringement of treaty rights in the following circumstances:

1. if, in exercising its taking up powers, a province: (i) fails to uphold the honour of the Crown; (ii) breaches its fiduciary duties in dealing with Aboriginal interests; or (iii) breaches its duty to consult and accommodate treaty rights, as appropriate, whenever they are sufficiently impacted;[746] or
2. if the taking up of lands would leave a First Nation with "no meaningful right" to exercise its treaty rights within its traditional territory,[747] or would result in a "meaningful diminution" of a treaty right.[748]

Whilst *Grassy Narrows* has similarities to the *Beaver Lake Cree* case, it is worth noting whilst Beaver Lake Cree initially sought to revoke all projects and development, this was dismissed by the judge; they then merely sought injunctive relief which does not seek to return the land protected under treaty to the communities which it rightfully belongs, undermining the purpose of the treaty. The real intension behind The Numbered Treaties was highlighted in the formation of Treaty 11.

Aboriginal Treaty 11

In the Treaty 11 region the government wanted to leave the Native people as hunters and trappers, and saw no need, just great expense, in a major intervention in native life.[749] In districts

[746] Ibid, Para 48
[747] Ibid, Para 52; Mikisew Cree First Nation v Canada (Minister of Canadian Heritage) 2005 SCC 69. Para 57-59
[748] Ibid
[749] Kenneth Coates & William Morrison, 'Best Left as Indians: Federal Government - Native Relations in the Yukon Territory, 1894 – 1950', Canadian Journal of Native Studies (Winter 1985)

such as the Mackenzie Valley and nearby Yukon Territory the aim was to leave the aboriginals off reserves and without treaty.[750] The government would only be interested in negotiating a treaty if non-native developments interfered with their plans, giving little attention to native wishes and prioritising the goals and ideals of the federal government.[751] It is argued the intension of this was to ensure the treaty would serve federal and non-native interests first and foremost and would not be structured to deal with the particular problems or wishes of the First Nations.[752] After decades of ignoring First Nation requests to enter into treaty, oil was discovered in 1920 at Norman Wells leading to 'lightning speed' treaty negotiations in this region.[753] This example alone highlights the underlying motivation behind the numbered treaties and the priorities of the Canadian government; oil.

Human Rights

Not only are native rights being sacrificed for the oil sand industry, but human rights are too. Principle 1 of the Stockholm Declaration guarantees people to have the right to a healthy environment,[754] enshrining this human right under international law. However it is left to the State to deal with environmental degradation and 'to ensure activities within their jurisdiction do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction.'[755] According to the *Stockholm Declaration*, "both aspects of man's environment, the natural and the man-made, are essential to his well-being and to the enjoyment of basic

[750] Ibid
[751] Ibid
[752] Ibid
[753] Terry Fenge & Jim Aldridge, 'Keeping Promises: The Royal Proclamation of 1763, Aboriginal Rights, and Treaties in Canada', (McGill-Queen's University Press. 2015) pg 100
[754] Declaration of the United Nations Conference on the Human Environment, G.A. Res. 2997, princ. 21, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (June 16, 1972) ("Stockholm Declaration"), Principle 1
[755] Ibid, Principle 21

human rights", suggesting this is an individual right, yet the right to a clean and healthy environment is largely accepted as a 'third generation right' which is largely unofficial 'soft law'.[756] First generation (individual) rights are usually deemed the most important so the *Stockholm Declaration* could be interpreted as suggesting the right to a healthy environment is as fundamental as other basic human rights yet it is not accepted as such. Indeed, if it were considered more than a third generation (unofficial) right, more claims could be made against the state under international law, particularly for those affected by the oil sands. Indeed:

> *"Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations."*[757]

Yet this does not go far enough to recognise these rights as fundamental international human rights, lacking enforceability and effectiveness. Whilst over the next few decades this sparked a large movement towards environmental protection and sustainable development, the next landmark conference held in Rio was a missed opportunity, failing to announce an explicit human right to a healthy environment.[758] However, such language had been proposed and rejected from the Declaration which some suggest may represent an intentional step away from such a commitment.[759] Indeed the similarly silent human rights treaties and international interpretation stemming from Rio would suggest further that this was the purpose of not

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[756] Clayton Thomas-Muller (of the Mathais Colomb Cree Nation), 'We Speak for Ourselves' (Oil Sands Truth: Shut Down the Tar Sans) < http://oilsandstruth.org/we-speak-ourselves> accessed 9th October 2016
[757] Declaration of the United Nations Conference on the Human Environment, G.A. Res. 2997, princ. 21, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (June 16, 1972) ("Stockholm Declaration"), Principle 1
[758] Dinah L. Shelton, 'What Happened in Rio to Human Rights?' (1992) 3(1) Y.B. of Int'l Env. L. 75, 82
[759] Ibid.

providing this 'right'. Yet just because the right to a healthy environment is not specifically mentioned, this does not mean humans do not have a right to it,[760] therefore citizens and those affected by the negative environmental impacts of the oil sands could potentially raise a claim against the state for breaching these rights, and if successful could set an important precedent surrounding the right to a healthy environment.

Although the *Rio Declaration* proclaims "human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature",[761] it too did nothing to establish the right to a healthy environment as a human right. The Rio conference shifted focus to the concept of SD and as this concept emerged in the international community, references to human rights for environmental protection faded in comparison. This highlighted the uncertainty about the role human rights law could play in realising environmental protection.[762] Whilst, a substantive human right to a healthy environment still does not yet exist in international law, recognition of the natural links between human rights and the environment has greatly increased in recent years[763] and is therefore moving in the right direction.

Furthermore, the *Rio Declaration* focused global attention on environmental concerns and on the unsustainable nature of human activities. More importantly, the *Rio Declaration* marked a global recognition that human activity was undermining the integrity of natural systems on

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[760] Rebecca Bratspies, 'Do We Need A Human Right to a Healthy Environment?', Santa Clara Journal of International Law. 13, 1 (2015) pg 59

[761] Rio Declaration on Environment and Development, U.N. ESCOR, princ. 2, U.N. Doc. A/CONF.151/26 (Vol. I) (1992) ("Rio Declaration"), Principle 1; Lorraine Elliott, The Global Politics of the Environment (2nd edn, Palgrave MacMillan 2004) 94

[762] Dinah L. Shelton, 'What Happened in Rio to Human Rights?' (1992) 3(1) Y.B. of Int'l Env. L. 75, 82

[763] Ole W. Pedersen 'European Environmental Human Rights and Environmental Rights: A Long Time Coming?' (2008) 21(1) Geo. Int'l Envt'l L. Rev. 73, 81)

which human life and society depend,[764] emphasising the importance of access to information, public participation, and access to justice for environmental protection.[765] Therefore rather than considering environmental protection as a precondition for human rights, this approach uses human rights to achieve environmental ends.[766]

Despite the *Rio Declaration* appearing to backtrack on the rights recognised in the *Stockholm Declaration*, the latter nonetheless provides the right to a healthy environment which is not adhered to in the oil sand region. The level of pollution, both airborne and in the Athabasca River, is undermining this treaty right. The high level of rare cancers[767] alone supports this side of the argument, not only demonstrating the effects of the 'unhealthy environment', but suggesting further breaches of the right to life as set out in the Canadian Charter.[768]

Further, in July 2010, *the United Nations General Assembly* passed a resolution recognizing the fundamental right to water and sanitation enshrining it in international law.[769] It has since been conceded that the right to water not only exists, but that it is integral to the right to an adequate standard of living under the *International Covenant on Economic, Social, and Cultural Rights*,[770]

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[764] Rebecca Bratspies, 'Do We Need A Human Right to a Healthy Environment?', Santa Clara Journal of International Law. 13, 1 (2015) pg 58
[765] Rio Declaration on Environment and Development, U.N. ESCOR, princ. 2, U.N. Doc. A/CONF.151/26 (Vol. I) (1992) ("Rio Declaration")
[766] Rebecca Bratspies, 'Do We Need A Human Right to a Healthy Environment?', Santa Clara Journal of International Law. 13, 1 (2015) pg 54
[767] Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7
[768] Canadian Charter of Rights and Freedoms, Part of the Constitution Act (1982), Section 7
[769] Resolution A/RES/64/292. United Nations General Assembly, July 2010
[770] International Covenant on Economic, Social and Cultural Rights. Adopted and opened for signature, ratification and accession by General Assembly resolution 2200A (XXI) of 16 December 1966; entry into force 3 January 1976, in accordance with article 27; 'Tar Sands and Human Rights'. (Manitoba Energy Justice Coalition: No Energy East Campaign) per Peter Kent, former federal Environment Minister

suggesting that Canada has a duty to prevent third parties from interfering with the enjoyment of this right. This can be achieved by protecting local communities from pollution and inequitable extraction of water by corporations or governments, and avoiding acts which may result in potential pipeline spills that could threaten the safety of drinking water.

The First Nation communities rely on the Athabasca River as an important resource, providing them with fresh fish and water to maintain their traditional way of life. The issues mentioned in Chapter 2.4 demonstrate how this fundamental human right to water and sanitation could also be breached by the oil sands industry. Draining the river water to wash the oil from the sands and heat the sands is not only using huge quantities of this vital resource but is in turn polluting what is left of it, turning the once blue river brown,[771] with polluted water from the tailings ponds contaminating the land, wildlife, and communities.

4.4 Summary

The legal issues highlighted throughout this chapter suggest that not only are the issues in the oil sands region going seemingly unpunished, with little accountability placed on the corporations and decision makers that are causing the damage, or on the states for permitting it, but the effectiveness of international environmental laws and treaties is also somewhat lacking. Whilst a remedy could potentially be found in recognising ecocide as a crime against humanity, there is not yet enough support or concern for such a drastic change in attitude on a global scale. Until such a time comes, the First Nations and the global community as a whole

[771] Clayton Thomas-Müller, 'Tar Sands: Environmental justice, treaty rights and Indigenous Peoples', Canadian Dimension. 42 2 (2008)

must rely on ineffective legal principles and treaties in order to halt further damage to the environment and surrounding ecosystems.

Whilst Principle 1 of the *Stockholm Declaration* should ensure that humans have the right to a healthy environment[772] and that signatories work towards Sustainable Development and resource preservation for future generations,[773] the issues highlighted above would suggest this has not been the case.

In terms of the sustainability of this industry, the issues start with the principle itself. Although there is no concise definition of the principle, the word 'sustainable' means that something is capable of going on forever, however the oil sands are not. The destruction of the boreal forest, natural ecosystems, habitats and pollution of the land is therefore at the expense of an industry with no longevity and unknown implications on the environment. Although the most widely accepted Brundtland definition of SD suggests that as long as the environment is factored in to decisions, with society and the economy, that it will be sustainable,[774] it is clear that this is not going far enough to achieve the purpose that environmental law should be achieving. Of course, this may be due to the anthropocentric concept that is created by people to achieve human ends, with little consideration to the preservation of the environment itself. Indeed the notion of intergenerational equity supports this, considering the Earth as a 'benefit' to be passed down to future generations,[775] looking at the world as a matter for property law.

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[772] Declaration of the United Nations Conference on the Human Environment, G.A. Res. 2997, princ. 21, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (June 16, 1972) ("Stockholm Declaration"), Principle 1
[773] Ibid
[774] United Nations, (1987) Our Common Future - Brundtland Report.
[775] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 19-26

Yet a more contemporary approach would see the issues surrounding the oil sands as an ethical concern,[776] suggesting there is a moral duty to protect resources and the planet[777] as opposed to owning the land and having the right to use as we please. This would therefore be in line with the idea of the 'Earth Community',[778] wild law and ecocide, taking a more pre-emptive, preventative and proactive approach, allowing for action to be taking before the damage is done.[779] This in turn would be more supportive of the precautionary principle instead of the polluter pays principle, creating a more effective basis for environmental law.

Despite steps being taken in Federal and Provincial Canadian legislation to make the oil sands compliant with International law and policy, these acts merely allow people to get licenses to pollute or pay the price afterwards, with little thought to preventing the environmental degradation in the first place. Indeed the mallards that mistakenly landed in polluted tailings ponds are a prime example of the deficiencies of both the international *Convention on the Protection of Migratory Birds,*[780] and *Canada's Migratory Birds Convention Act*.[781] If the tailings ponds were properly safeguarded, or not even there, these protected species would not have been killed in such numbers.

But the fundamental concern regarding the illegality of this industry is the countless breaches of human rights and treaty violations, suffered mainly by the First Nation communities. The addition of the rider clauses incorporated into the numbered treaties suggest the Canadian

[776] Charles J. Kibert, Leslie Thiele, Anna Peterson & Martha Monroe, 'The Ethics of Sustainability', (2011) Chapter 4.
[777] John L. Renne, 'Transport Beyond Oil: Policy Choices for a Multimodal Future', (Island Press. 2013) pg 62
[778] The idea of the Earth community see's the entire world and everything on it as one collective, one in the same.
[779] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8
[780] Convention on the Protection of Migratory Birds 1916
[781] Migratory Birds Convention Act (MBCA), 1994

government knew exactly what they were planning to do all along, indeed the hasty decision to bring the northwest regions under Treaty 11 after discovery of the reserves, despite ignoring previous requests to do so, highly alludes to the possibility that the Canadian government never truly cared to preserve the traditional ways of the First Nation communities, they were only concerned with gaining control over the land for future development and exploitation. Furthermore, the use of these rider clauses, and the treaties themselves, highlights that these aboriginal groups perhaps did not fully understand what they were agreeing to in the first place.[782] *Beisel* argues First Nation signatories did not understand the treaty to be a cession of their rights to their traditional lands, they interpreted the treaty as being an agreement to share the fruits of the land, but not the land itself. The Treaty 7 First Nations agree:

> *"We believed and understood [that we would] share this territory amongst each other and we also believed that the land could not be given away because of its sacredness; therefore, it did not belong to us or anybody else. The earth is just put there by our creator for only our benefit and use."*[783]

Whilst this particular dispute surrounded water use in relation to Treaty 7, the core understanding of what First Nations were signing up to is missing and therefore these treaties cannot be considered transparent or democratic in line with the rule of law. The ambiguity of these clauses further muddies the waters. However, limiting aboriginal rights in such circumstances must be 'justified'. The basic requirements for justifying the infringement of these treaty rights involve establishing a compelling and substantial objective consistent with the

[782] Vivienne G. Beisel, 'Do Not Take Them From Myself And My Children For Ever": Aboriginal Water Rights In Treaty 7 Territories And The Duty To Consult', (Saskatoon, 2008) pg 113, 122
[783] *R v Badger* [1996] 1 S.C.R. 771; [1996] S.C.J. No. 39 (QL), para 114 per Louise Crop Eared Wolf, Blood. Soucre: ibid

Crown's fiduciary obligations to Indigenous peoples. For a government objective to be compelling and substantial, it must be considered from both the public and the Aboriginal perspective. It must also further the goal of reconciliation of Indigenous peoples' rights and interests with the Crown's assertion of sovereignty over Indigenous lands. It must also be established that the infringement of the treaty right is necessary to achieve the compelling and substantial objective and that it minimally impairs the treaty rights.[784]

The Crown's fiduciary obligations to the indigenous people of Canada highlight a unique and long-standing relationship. It has long been recognised that these communities have their own status and special rights[785] and since at least 1763, the Crown has taken responsibility for the protection of Aboriginal communities and their rights, protecting their land and traditional way of life against settlers.[786] It could therefore be argued that that forcing aboriginal groups give up their land for temporary mining would not fit under the justification requirements as this would not be compliant with the Crowns fiduciary obligations to the First Nations.

It is suggested that in order to make the oil sands industry more compliant with Canadian legislation and International law and policy, one thing is clear; there needs to be more enforceability and accountability with regards to environmental law as a whole. Being able to withdraw from International environmental legislation because you have not been compliant with it, as in the case of *Kyoto*, completely undermines the purpose of the legal system. Perhaps making individuals accountable would see the important shift from 'polluter pays' to 'polluter

[784] Bruce McIvor, 'What Tsilhqot'in and Grassy Narrows Mean for Treaty First Nations', (First Peoples Law, 2015) <http://www.firstpeopleslaw.com/index/articles/173.php> accessed 19th July 2017
[785] Kenneth Lysyk, 'The Unique Constitutional Position of the Canadian Indian', (Canadian Bar Review, 1967) 45 513-53.
[786] Kent McNeil, 'Fiduciary Obligations and Aboriginal Peoples', (Digital Commons, 2015) 16 pg 907-908

no longer pollutes',[787] which would indeed be more in line with the Canadian justice model which focuses on deterrence,[788] or perhaps holding Canada accountable to the ICC for their treaty and human rights violations would make the public take notice of the illegality going on within the oil sands region or finally, perhaps it is *Higgins'* approach to criminalising 'ecocide'[789] that retains the answer. Whichever path, something must be done to challenge these blatant crimes and change attitudes to avoid future failings like the *Yasuni Initiative*.

[787] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8
[788] Bruce P. Archibald, 'Criminal Justice Models: Canadian Experience in European and Islamic Comparative Perspective' (April 11, 2016). <https://ssrn.com/abstract=2763012> accessed 7th July 2017
[789] Polly Higgins, 'Rome Statute', (Eradicating Ecocide: 2010-2015) <http://eradicatingecocide.com/the-law/rome-statute/> last accessed 9 September 2016.

Chapter Five

What Can Be Done and Possible Recommendations?

The industry itself, the environmental consequences and wider health and social issues have now been analysed at length throughout the previous chapters, suggesting incompatibility with International environmental law and core principles of environmental law and policy. However, improvements could potentially be made to harness the use of these resources in a sustainable way or find potential alternatives, with less stigma attached.

5.1 Greening of this Industry

The *Canadian Energy Research Institute* released a report titled *Green Bitumen,* attempting to define an approach to "greening" the oil sands.[790] The standard used in this report for "green" oil sands is defined as the same level of greenhouse gas emissions per unit of energy as conventional oil, to deflect the criticism that oil sands products are more greenhouse gas intensive than conventional oil.[791] According to *CERI*, the greenhouse gas problem "is a drawback that will hinder future oil sands development."[792]

The proposal to green the oil sands by increasing reliance on nuclear power has its own environmental, health, and safety risks that require careful consideration. However, there are some that argue nuclear power is the answer to a reduction of GHG emissions and meeting

[790] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009)
[791] George Hoberg and Gordon McCullough, 'Can the Oil Sands be made Environmentally Sustainable?' (GreenPolicyProf, 2009)
[792] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009) pg 1

climate change targets.[793] However the argument put forth goes beyond merely climate change and emissions, addressing concerns about boreal forest habitat destruction and impacts on water quantity and quality.

Whilst bringing the greenhouse gas emissions of oil sands into line with conventional oil would represent progress, the Alberta government's own objective of 'developing the oil sands in an environmentally responsible way'[794] requires more than just a reduction of GHG emissions, calling for a dramatic overhaul of regulations.

The *CERI* report suggests some potential ways to combat the GHG issue:[795]

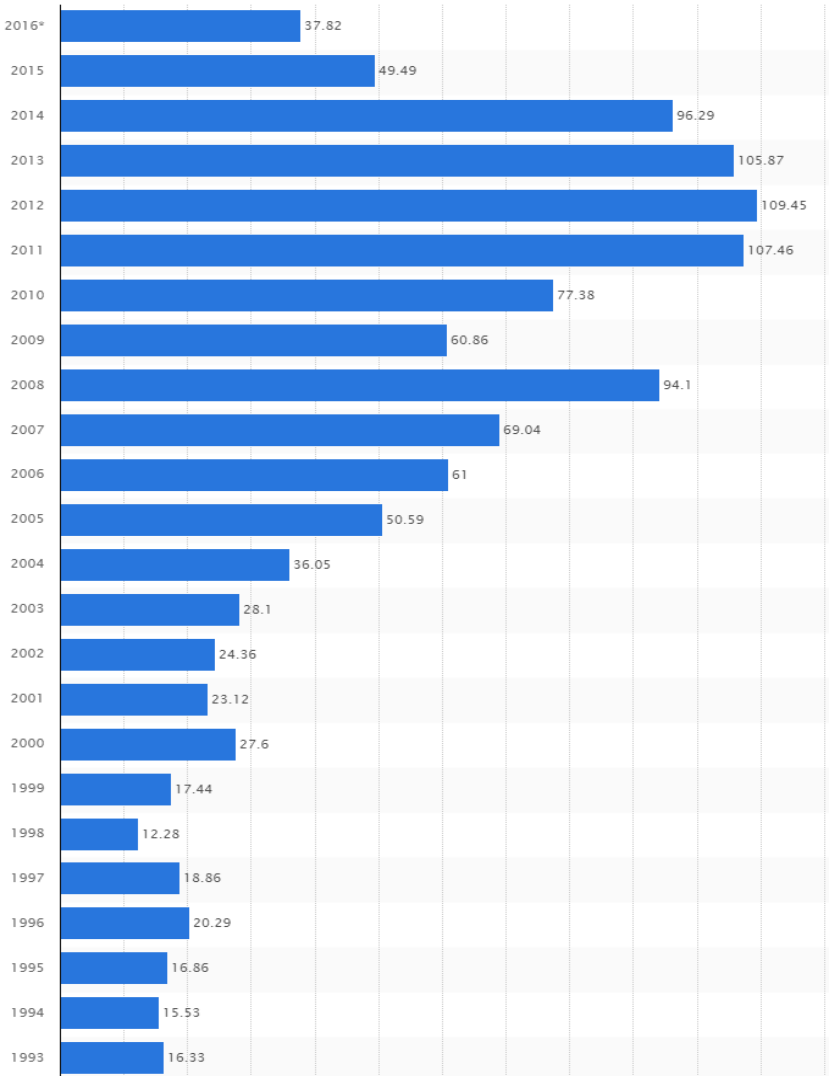
1. Using nuclear power to produce steam and possibly electricity to fuel the extraction process. A nuclear facility, such as the ACR-700, could potentially produce the steam required, but the technology's application to oil sands is "still early in development". This would be the most expensive of the three options, resulting in a cost of $105 US/barrel to justify this option.[796]

2. Gasification of coal or coke[797] to harness the use of syngas, some of which can actually be produced from by-products of the oil sands process, replacing the need for natural gas. This is less carbon intensive. Using a combination of a gasification system and

[793] Duane Bratt, ' Implementing Kyoto In Canada: The Role of Nuclear Power', The Energy Journal, 26 (1) pg 108
[794] Government of Alberta, 'Responsible Actions: A Plan for Alberta's Oil Sands', (Strategy 1. 2008) pg 11
[795] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009)
[796] Ibid
[797] Gasification is the process in which the coal is converted into a syngas. Source: ENERGY.GOV, 'How Coal Gasification Power Plants Work', (US Department of Energy) < https://energy.gov/fe/how-coal-gasification-power-plants-work> accessed 20th February 2016

carbon capture and storage, achieving the "green bitumen" standard would cost an additional $13.50 US/barrel, requiring oil to be roughly $95 US/barrel to be economic.[798]

3. Implementing a carbon capture and storage system to capture carbon dioxide from gas streams emitted from development sites, storing it in reservoirs and deep rock formations. This is the most economic and although it would add an additional cost of $2.25 US/barrel, requiring oil to be $85 US/barrel to be economically viable, it is the cheapest of the three options.[799]



[798] Ibid
[799] Ibid

Figure 4. *Average annual OPEC crude oil price from 1960 to 2016 (USD per barrel)*[800]

However, with oil prices at an all-time low, with costs per barrel so low that companies are making a loss,[801] these options start to look less desirable. This is one of the critical issues with the oil industry, it is based on supply and demand, with prices fluctuating to fit in with this ever-changing market. This fluctuation is demonstrated in *Figure 4*, highlighting that perhaps the ends no longer justify the means.[802] Indeed when crude oil prices were around $109 a barrel in 2012 the tar sands industry had enormous potential with attractive returns on investment, but with the price of crude oil plunging to $32 a barrel in 2016, this has obliterated the potential economic benefit that initially launched the industry.[803]

If oil prices per barrel remain this low, the three options listed in the CERI report would be even less economically viable, but Alberta has some of the best wind and solar resources in the world, with a currently untapped geothermal potential.[804] Clean, renewable and transitional energy resources in Alberta are more than capable of meeting future demand in the province, even if electricity consumption doubles over the next 20 years. Alberta can harness this energy with

[800] Statita, 'Average annual OPEC crude oil price from 1960 to 2016 (in U.S. dollars per barrel)', (The Statistics Portal. 2016) <https://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/> accessed 14 October 2016

[801] Phil McKenna, 'With Some Tar Sands Oil Selling at a Loss, Why Is Production Still Rising?', (Inside Climate News. 2016) <https://insideclimatenews.org/news/23022016/tar-sands-becoming-worthless-production-rises-even-prices-plummet> accessed 14 October 2016

[802] Jeff Rubin, 'Why the oil sands no longer make economic sense', (The Globe and Mail, November 2015) < http://www.theglobeandmail.com/report-on-business/rob-commentary/oil-sands-no-longer-make-economic-sense/article27170104/> accessed 30th January 2016

[803] Phil McKenna, 'With Some Tar Sands Oil Selling at a Loss, Why Is Production Still Rising?', (Inside Climate News. 2016) <https://insideclimatenews.org/news/23022016/tar-sands-becoming-worthless-production-rises-even-prices-plummet> accessed 14 October 2016

[804] The Pembina Institute, 'Greening the Grid: Powering Alberta's Future with Renewable Energy', (The Pembina Institute. Fact Sheet) <https://www.pembina.org/reports/greeningthegrid-fs.pdf> accessed 15 October 2016

proven technologies already in use in Alberta and elsewhere.[805] Perhaps the question should not be 'can the oil sands be greened?', but 'can Alberta be greened?'.

5.2 Opinions of the Industry

Rather than spending taxes subsidizing polluters, creating more toxic communities and deepening the environmental issues, Alberta could put those resources towards real solutions, creating thousands of jobs and working towards a sustainable future for the province.[806] The tar sands are a resource Alberta needs to be moving away from not deeper into. Indeed *Greenpeace* have argued that harnessing wind and solar power will:

> *"diversify [the] economy, address the threats of climate change, create jobs and allow Alberta to be a leader - all without sacrificing health, or [the] environment to do it.'*[807]

Perhaps the Albertan government could follow the example set by Texas, who have introduced mandatory energy saving goals for utilities,[808] and employ more workers in the solar power industry than they have ranches.[809]

There is support for change among North Americans, calling for global leaders to address these issues.[810] Public opinion polls have found increasing public support for effective actions to

[805] Ibid
[806] Mike Hudema, 'The Pathway to Climate Leadership is Paved with Solar Not Tarsands', (Greenpeace. 2015)
[807] Ibid
[808] The Pembina Institute, 'Greening the Grid: Powering Alberta's Future with Renewable Energy', (The Pembina Institute. Fact Sheet) <https://www.pembina.org/reports/greeningthegrid-fs.pdf> accessed 15 October 2016
[809] Mike Hudema, 'The Pathway to Climate Leadership is Paved with Solar Not Tarsands', (Greenpeace. 2015)
[810] Nathan Vanderklippe, Ontario refuses to call Alberta's oil sands 'sustainable and responsible', (The Globe and Mail, 2011) < http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/ontario-refuses-to-call-albertas-oil-sands-sustainable-and-responsible/article589650/> accessed 27th March 2016

prevent climate change, even when these actions result in increases to energy costs,[811] with scientists suggesting the time has come for a moratorium of the oil sands industry.[812] Of course it can be difficult for Canadian's to see past the immediate economic boon, especially with opponents overstating the environmental risks and proponents seemingly oblivious to the consequences of continuing to feed the nation's oil addiction. Yet of the majority of the public are willing to pay more for energy to help address climate change and undo the effects of the oil sands.[813] This would suggest that the level of public concern is such that it is time to act.

NGO's such as *Greenpeace* and *FoE* have been pressuring governments, educating shareholders, working with impacted communities and protesting against proposed expansion and pipelines,[814] and activists argue that climate change should be addressed through solar power, not 'dirty oil'.[815] This suggests the focus of those involved in the energy sector is in the wrong place. Whilst these would be long term solutions, a US style superfund[816] could help address the more immediate devastation caused by this industry. This federal initiative denotes that large corporations may donate into a pot, the proceeds of which will be put towards clean-up costs of contaminated sites, natural disasters and environmental hazards to provide a clean and safe environment. Whilst the polluter pays principle is not acknowledged here, this is a proactive

[811] Bloomberg, 2014; New York Times/Stanford University, 2015
[812] Wendy Palen et al, 'Oil Sands Moratorium', <http://www.oilsandsmoratorium.org/scientists/> accessed 30th January 2017
[813] Ibid
[814] Mike Hudema, 'The Pathway to Climate Leadership is Paved with Solar Not Tarsands', (Greenpeace. 2015)
[815] Ibid
[816] The US Environmental Protection Agencies' Superfund program is responsible for cleaning up some of the nation's most contaminated land and responding to environmental emergencies, oil spills and natural disasters. Source: EPA, 'Superfund', (US Environmental Protection Agency, 2016) <https://www.epa.gov/superfund> accessed 19 October 2016

means by which those affected can seek change. An initiative like this could see remediation standards increase, and could also see standards set for remediation in Alberta.

The *Sierra Club's 'Dirty Fuel Campaign'* is also calling for an end to this industry, arguing that the tar sands are single handily responsible for Canada failing to meet their *Kyoto* targets. Some US ecologists further support this notion, claiming that the 'oil sands are industrializing and degrading some of the wildest regions of the planet, contaminating its rivers, and transforming a landscape that stores huge amounts of carbon into one that releases it', supporting that the industry's emission problem is two-fold: 1. the ability to store CO_2 from the atmosphere is weakening due to deforestation; and 2. the industry itself is releasing a huge amount of emissions into the atmosphere. *WWF Global* give further support, stating Alberta is a "life support system for the planet," home to 11% of global terrestrial carbon sinks which are imperative for mitigating the climate change, calling for tighter regulations.[817]

Friends of the Earth also protested against further expansion via the keystone pipeline, highlighting that the issues would not only impact the environment and surrounding ecosystems by creating 'total destruction of pristine areas within the Canadian Boreal forest, one of the few large, intact ecosystems on Earth, by clear cutting the forest, draining the wetlands and hauling away living matter and soil to expose the tar sands', but also stating this would impact climate change and native people. The *Indigenous Environmental Network*, along with many First Nation communities, have also demonstrated opposition.

[817] WWF Global, 'Scraping the bottom of the oil barrel a significant new climate risk' (WWF Global: 2008) <http://wwf.panda.org/wwf_news/?142181/Scraping-the-bottom-of-the-oil-barrel-a-significant-new-climate-risk> accessed 20 October 2016

Whilst naturally environmental organisations would be opposed to this industry, scientists and lawyers alike have demonstrated credible opposition,[818] labelling Alberta "one of the bleakest scenes of man-made destruction",[819] calling for an end to oil sands and criminalisation of the industry through a crime of ecocide. Whilst this may cause issues with retrospective law, this could be one of the most pro-active approaches to combat climate change by creating enforceability and accountability, aligning international environmental law with the climate change agenda.

Indeed the US seem to have taken a step towards this with the rejection of the keystone pipeline, citing that it would not be compatible with climate change objectives, in one of the most important political decisions for the Obama Administration.[820] That being said, it is unclear how this decision will play out over the coming years as the Trump administration plans to revive the proposals for the keystone pipeline,[821] undoing the Obama administration's controversial decision in an attempt to 'make America rich again'.[822] Trump, a climate change sceptic, is taking steps to eliminate America's *Environmental Protection Agency* altogether,[823] and has since

[818] See footnote 666; Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8

[819] Canada's oil sands: The steam from below, Science and Technology, The Economist 2014

[820] Keystone XL: The wrong question, LA Times - October 6th 2011

[821] ELANA SCHOR, 'How 'kooky' is Trump's Keystone pipeline proposal?'. (Politico, 2016) <http://www.politico.com/story/2016/06/donald-trump-keystone-canada-energy-224204> accessed 13th November 2016

[822] Per Donald Trump (news conference in Bismarck, North Dakota US May 26, 2016) Source: Valerie Volcovici & Emily Stephenson 'Trump vows to undo Obama's climate agenda in appeal to oil sector', (Reuters, May 2016) <http://www.reuters.com/article/us-usa-election-trump-energy-idUSKCN0YH2D9> accessed 13th November 2016

[823] Arthur Neslen, 'Donald Trump 'taking steps to abolish Environmental Protection Agency'', (The Guardian, 2017) < https://www.theguardian.com/us-news/2017/feb/02/donald-trump-plans-to-abolish-environmental-protection-agency> accessed 8th March 2017

placed Scott Pruitt[824] as minister in charge of the EPA's agenda,[825,826] suggesting that he plans to feed America's addiction to oil.

The debates surrounding pipeline proposals are one of the clearest indicators of public opinion surrounding this industry. In 2015, 25,000 people marched in Quebec City to say no to new pipelines, demonstrating their commitment to a 20% reduction in GHG emissions. The strongest opposition comes from First Nations with 87 bands signing up to the '*Treaty Alliance against Tar Sands Expansion'*, aiming to prevent the development of any pipeline carrying bitumen from Alberta, both from Canada and the US. Despite this, Canada is transporting record amounts of oil through pipelines to the US. Indeed in September 2016, US imports increased by 17% to 3.46 million barrels per day, in an attempt to recover from financial loses as a result of the uncontrollable forest fires earlier in 2016.[827]

Expansion is not just visible throughout Canada and the US. Whilst initially *European Parliament Environment Committee* petitioned to 'keep tar sands out of Europe', the European position seems to have shifted with two thirds of European oil refineries now ready for tar sands

[824] Scott Pruitt is a climate change sceptic who has previously, in his role as Oklahoma attorney general, rejected climate change, calling it a hoax or a fraud and announced his intent to repeal all of the Obama administration's environmental regulations. He has also sued the federal government to prevent rules about air and water pollution from taking effect. Source: Robinson Meyer, 'Trump's EPA Pick Is Skeptical of More Than Just Climate Change', (The Atlantic, 2016) < https://www.theatlantic.com/science/archive/2016/12/trumps-epa-pick-is-skeptical-of-more-than-just-climate-change/509960/> accessed 8th March 2017

[825] Alan Yuhas, 'Donald Trump's cabinet nominations: what we know so far', (The Guardian, 2016) <https://www.theguardian.com/us-news/2016/nov/18/donald-trump-cabinet-nominations-what-we-know-so-far> acceded 19th November 2016

[826] Robinson Meyer, 'Trump's EPA Pick Is Skeptical of More Than Just Climate Change', (The Atlantic, 2016) < https://www.theatlantic.com/science/archive/2016/12/trumps-epa-pick-is-skeptical-of-more-than-just-climate-change/509960/> accessed 8th March 2017

[827] SHEELA TOBBEN & ROBERT TUTTLE, 'Oil sands surplus jamming up pipelines to U.S., pushing more crude into rail cars', (The Globe and Mail, 2016) <http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/oil-sands-surplus-jamming-up-pipelines-to-us/article32026139/> accessed 13th

imports.[828] Initially the *European Parliament Environment Committee* held an exhibition to demonstrate how Canada's magnificent boreal forest was being destroyed by the rush to exploit the tar sands,[829] but research carried out by *MathPro* found 71 of Europe's 95 refineries can now handle heavy or pre-processed crude from tar sands oil.[830] This suggests that Europe is readying itself for oil sands imports. However, many British firms such as *Shell*, *RBS* and *BP*, face onslaught from oil sands campaigners, threatening to turn their annual meetings into green referendums.[831] If indeed Europe is preparing to accept Canadian oil, this would undermine their climate change objectives and the treaties under which the EU is bound.

Whilst the majority of opposition to this industry naturally comes from environmental organisations, such as *Greenpeace, WWF* and *Sierra Club*, the *Co-operative Group* have also voiced their distaste, releasing a briefing paper designed to rally opposition, countering the oil companies' justification that their involvement in carbon-intensive oil extraction in Alberta was necessary to meet rising oil demand.[832] As an impartial and independent business, this could suggests their opinion is unbiased, making them more credible than an oil company or an environmental organisation.

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[828] James Crisp, 'Two thirds of European oil refineries ready for tar sands imports', (EurActiv.com: 2015) <https://www.euractiv.com/section/transport/news/two-thirds-of-european-oil-refineries-ready-for-tar-sands-imports/> accessed 20 October 2016

[829] Tarnished Earth Exhibition, (*Friends* of the Earth Europe, 2011) <http://www.foeeurope.org/stop-tarnishing-earth-tar-sands-petition-european-parliament> accessed 19th November 2016

[830] MathPro Inc, 'Assessment Of The European Refining Sector's Capability To Process Unconventional, Heavy Crude Oils' (Prepared for Friends Of The Earth Europe & European Federation For Transport And Environment. 2015)

[831] Terry Macalister, 'British firms face onslaught from tar sands campaigners', (The Guardian, 2010) <https://www.theguardian.com/business/2010/feb/28/canada-tar-sands-investor-protest> accessed 13th November 2016

[832] Ibid

But what is the opinion of the average Canadian, those not directly affected by the negative impact of this industry? A recent poll by Ipsos Reid Public Affairs, on behalf of the CAPP, found that there was almost a dead split in opinion amongst Canadian's, with 51% suggesting the environmental risks outweigh the benefits (*see Figure 5*).

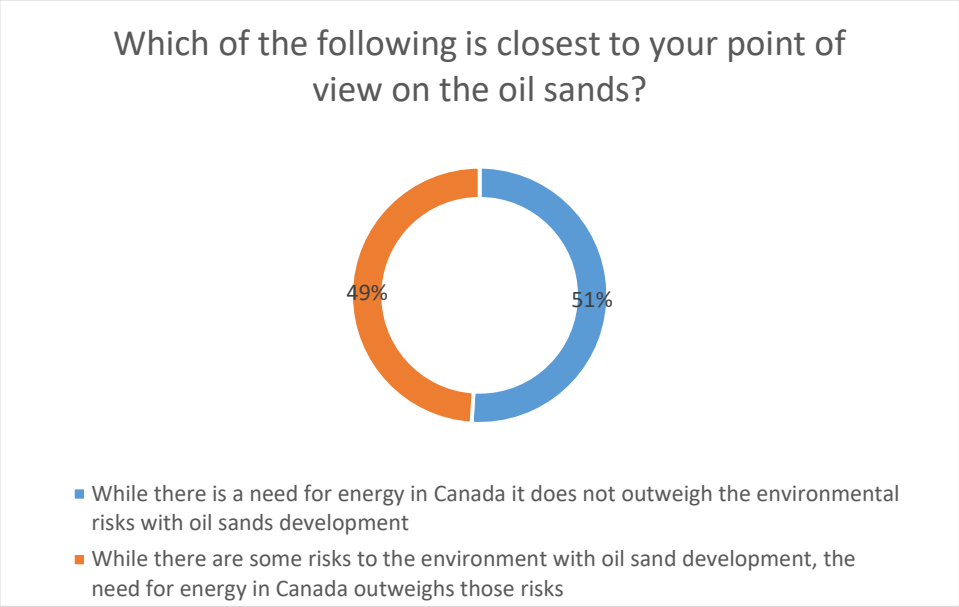

Figure 5. *Canadian opinions of the oil sand industry (IPSOS REID)*[833]

There must therefore be a balancing act with what the local people directly affected by this industry want, and what the wider population of Canada wants. However, perhaps the correct approach, especially when it is in line with the majority according to the above poll, is to respect the opinion of those that feel the brunt of the development. It is clear that there is mixed opinions on the oil sands, but in the 21st century can technology be harnessed in a way to appease the opposition and lessen the environmental consequences?

[833] IPSOS, 'Canadians Dead Split on Oil Sands' (Energy & Environment, 2010) <https://www.ipsos.com/en-ca/canadians-dead-split-oil-sands> accessed 22 July 2017

5.3 Can Technology Solve the Environmental Challenges?

One of the major concerns regarding the methods used to extract the oil from the tar sands is the age of the process itself. The method that was first witnessed in 1875, with the water naturally washing the oil out of the sands. The same basic principle is used today in order to extract the bitumen in the strip mines. However, more oil companies are now choosing to use *in situ* methods, injecting high-pressure steam into the ground to liquefy the oil, allowing for it to be more readily transported to refineries. This updated method allows for the majority of the land to remain intact and eliminates the need for tailings ponds.[834] Further, the water recovered from the bitumen can be cleaned with distillation for reuse. Steam-assisted gravity drainage is another method that has also proved particularly effective,[835] however the volume of steam needed for these methods create problems of their own. In order to create the steam, large amounts of natural gas is burned releasing gases and hydrocarbons into the atmosphere, negating the positives of these methods.

However, the *CERI* report suggests the use of Nuclear power to produce steam,[836] which although has its own risks, could prove to be a viable alternative. Yet, whilst *Suncor* found that by adding solvents to the steam could increase recovery and reduce the amount of water needed, *Imperial Oil* has replaced steam altogether by injecting solvents under high pressure but at much lower temperatures. Of course adding solvents to the steam, or injecting solvents,

[834] The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)
[835] SAGD involves drilling two horizontal wells through an oil-sands reservoir. Steam is then released from the top well and over a few weeks it will melt bitumen. The bitumen then percolates down and into the lower well, from which it is pumped to the surface. Source: The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)
[836] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009)

will come with their own health and environmental risks but could nevertheless 'save the oil sands', and illuminate the use of water altogether.[837] Furthermore, *Siemens* is developing new technology and methods altogether, a system that floods a thick copper cable with an electrical current to create an alternating magnetic field to melt bitumen. This method would use energy obtained from nuclear reactors,[838] eliminating emissions caused from burning and heating fossil fuels, thus lowering carbon emissions.

It is a positive step to see alternative methods in development, yet it is coming to the point where the damage has already been done. In September 2016 the Earth passed the symbolic 400 parts per million (ppm) CO_2 threshold, suggesting we are now unlikely to see a reduction below this. Arguably, the focus should be on eliminating fossil fuels altogether with the aim to be reliant on renewable energy, yet there are other ways to produce oil from oil sands and reduce emissions, ultimately achieving a sustainable industry.

Carbon Capture

Carbon capture and storage (CCS) is a process that first captures and then sequesters industrial CO_2 emissions before releasing it into the atmosphere. The CCS process involves:

(a) CO_2 capture and compression;
(b) CO_2 transport from the capture site to an injection/storage site;
(c) Injection and permanent storage of CO_2 in geological formations; and
(d) Upon injection completion, post-closure long-term monitoring of the CO_2 storage site.

[837] Geoffrey Morgan, 'Solvents to the rescue: How chemistry can save the oil sands industry', (Financial Post, 2016) <http://business.financialpost.com/executive/smart-shift/solvents-to-the-rescue-how-chemistry-can-save-the-oilsands-industry> accessed 8th March 2017
[838] The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)

A CCS system combining these features will reduce industrial CO_2 emissions being released into the atmosphere, aiming to bring this industry in line with global climate change targets, maintaining the economic benefit whilst reducing the negative impact on future generations. Initially CCS was considered a world saviour in the abatement of climate change[839] and indeed the Alberta Government still considers CCS a critical technology to reduce industrial GHG emissions. CCS is also key for Alberta to meet their own provincial targets set under Alberta's *Climate Change Strategy* under which the province aims to reduce annual GHG emissions from a 2010 baseline by 50 megatonnes (Mt) by 2020 and by 200 Mt by 2050.[840] However, in 2016 Alberta's oil sands operations currently emit roughly 70 Megatonnes (Mt) per year and whilst there is currently no legal limit in Alberta, the Alberta Government aim to create a legislated emissions cap on the oil sands of a maximum of 100Mt in any year, allowing room for growth and development.[841] It is unclear how the *Climate Change Strategy* reduction targets can be achieved if Alberta is preparing for a legalised increase in emissions, however the introduction of the carbon levy will create funding to put back in to technologies to reduce emissions. This in turn could help to remedy the high costs involved with CCS.

Alberta's steps to advance its CCS initiative by establishing a legal and regulatory framework to implement large scale CCS projects provides a potential solution for sustainable hydro-carbon production in Alberta but large scale CCS raises numerous issues.[842] Being the first large scale

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[839] Saadallah Al Fathi, Special to Gulf News, 'Carbon capture and storage: The devil lies in the details', (Gulf News. 2013) <http://gulfnews.com/business/analysis/carbon-capture-and-storage-the-devil-lies-in-the-details-1.1138063> accessed 20th November 2016

[840] AEP, 'Alberta's 2008 Climate Change Strategy', (January 2008) <http://aep.alberta.ca/forms-maps-services/publications/documents/AlbertaClimateChangeStrategy-2008.pdf> pg 7, accessed 30th January 2017

[841] Alberta Government, 'Capping oil sands emissions', (Alberta.ca) < http://www.alberta.ca/climate-oilsands-emissions.aspx> accessed 20 November 2016

[842] Nadia Conforti, Arnold Olyan & Garth Parker, 'Carbon capture and storage: an Alberta perspective'. (2012) I.E.L.R. 5, 176

use of CCS makes it a largely untested technology, creating a lack of certainty due to gaps in knowledge[843] and the high costs associated with it may dissuade firms from investing in this technology, and dissuade oil companies from using it.[844] Studies suggest that investors may be more inclined to invest in this technology if the government were to create a more stringent and durable climate policy.[845] However, even if CCS could get the necessary investment, as the *CERI* report highlighted, the oil sands oil would need to be $85 US/barrel to be economically viable,[846] which is still a dramatic increase on current oil prices (*see figure 4*).

Despite these drawbacks, a major milestone for this technology is the conclusions from the *Intergovernmental Panel on Climate Change* (IPCC)'s '*Special Report on Carbon dioxide Capture and Storage'* (SRCCS),[847] which found CCS may come to contribute 15–55% of the cumulative mitigation effort worldwide until 2100 and the inclusion of CCS in a mitigation portfolio could reduce the costs of stabilizing CO_2 concentrations by 30% or more,[848] suggesting the use of CCS

[843] Figures in reports such as SRCCS report vary and are based on assumptions as there is no previous large scale evidence. Similar scientific and technical knowledge gaps may also be seen when it comes to costs, life-cycle effects, storage capacity and permanence. Source: Anders Hanssona & Marten Bryngelsson, 'Expert opinions on carbon dioxide capture and storage—A framing of uncertainties and possibilities'. (2009) China Energy Efficiency. (37) 6, 2273–2282; Further, one of the main findings in the EU-funded project ACCSEPT is that the literature estimating CCS future costs is scarce and potentially misleading. The risks of seepage are still uncertain and the scale-up costs as well. Source: Anderson, J., de Coninck, H., Curnow, P., Flach, T., Groenenberg, H., Norton, C., Reiner, D., Shackley, S., Upham, P., Eldevik, F., Sigurthorsson, G., 2007. The ACCSEPT project: multidisciplinary analysis and gap-filling strategies. Det Norske Veritas AS.

[844] Bataille, C, Melton, N, & Jaccard, M 2015, 'Policy uncertainty and diffusion of carbon capture and storage in an optimal region', Climate Policy (Earthscan), 15, 5, pp. 565-582, Environment Complete, EBSCOhost, viewed 20 November 2016.

[845] Ibid

[846] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009)

[847] SRCCS, 2005. In: Metz, B., Davidson, O., de Coninck, H., Meyer. L. (Eds.), IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA.

[848] Ibid

is a viable method of reducing global CO_2 emissions. Indeed the majority (80%) of energy experts who participated in an EU survey believe CCS to be necessary to mitigate climate change.[849]

If cost-effective CCS could indeed reduce emissions, and prove more viable for Alberta than the use of steam in mining, but there is a number of other environmental concerns that technology could help to address in order to bring the oil sands in line with environmental policies.

Waste

As discussed above, *in situ* mining can reduce the waste water produced and the need for tailings ponds,[850] however this is essentially replacing one environmental problem with another, in the form of emissions for natural gas[851] and restricting animal movement.[852]

Use of the new technologies is increasing, thanks in part to the *Canadian Oil Sands Innovation Alliance*, in which member firms share information about their developments.[853] And whilst the main focus is on the reduction of carbon emissions, the government also intend for Alberta to reduce methane emissions by 45% from 2012 levels by 2025, the main source being the waste water in tailings ponds.[854] This is produced when the diluent that is used to process the bitumen breaks down, releasing methane into the atmosphere, however new technology could see this waste turned into profits. *Titanium Corp*. has developed and tested a system that reduces

[849] K. van Alphen, Q. van Voorst tot Voorst, M.P. Hekkert, R. Smits, 'Societal acceptance of carbon capture and storage technologies', Energy Policy, 35 (2007), pp. 4368–4380
[850] The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)
[851] Ibid
[852] Muhly, T, Serrouya, R, Neilson, E, Li, H, & Boutin, S 2015, 'Influence of In-Situ Oil Sands Development on Caribou (Rangifer tarandus) Movement', Plos ONE, 10, 9, pp. 1-15, Academic Search Complete, EBSCOhost, viewed 20 November 2016.
[853] The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)
[854] Jeremy Van Loon and Rebecca Penty, 'Gassy Ponds May Hold Key to Alberta's Oil-Sands Emissions Battle', (Bloomberg Markets: 2016) <https://www.bloomberg.com/news/articles/2016-08-18/canada-s-oil-sands-ponds-low-hanging-fruit-to-cut-emissions> accessed 26 November 2016

methane emissions while at the same time recovering zircon, a mineral that is used in making ceramics, by mining the waste stream flowing from operations. This would result in less contaminated waste being injected back into the Earth and less methane emissions, helping Alberta to meet their targets, and would also provide a further boost to the Canadian economy that this time does not further damage the environment. Indeed one mine could produce 50,000 tons of zircon a year, attributing to 5% of the world's annual supply, earning as much as C$200 million in annual revenue.[855]

However, with oil prices in rapid decline (*see figure 4*), this technology is not yet cost effective. In order for this technology to be considered oil prices will need to stabilise at a higher rate to make it economically viable.[856] With the new carbon levy due to take effect from 2018, the oil companies would be paying for the emissions from waste anyway. Using technology to create value from this waste would not only be a huge help for the environment, it could potentially reduce these taxes in the long term and provide a monetary benefit. With the economy being the biggest driver behind this industry, this would be the perfect solution to the current tailings pond problem.

5.4 Recommendations

There is no way of knowing what it would look like if these technological advancements were implemented as it is impossible to predict the future; it is likewise impossible to ignore that the time for change is long overdue. Our reliance on oil is at an all-time high and with more and

[855] Ibid
[856] per Scott Nelson, CEO of Titanium Corp. Source: ibid

more products being developed every day, unless we find a sustainable and suitable alternative this addiction will continue to grow.

In 2016 solar power produced more electricity in the UK than coal for the first time over a six month period,[857] demonstrating that alternative renewable energy is now a viable solution to our dependence on fossil fuels. *Fatih Birol,* executive director of the *Global Energy Advisory Agency,* said "we are witnessing a transformation of global power markets led by renewables", with the rate at which renewable technology is increasing leading to a decrease in the historic high prices.[858] With some of the most suitable weather conditions in the world, Canada should be investing the money they are investing in the oil sands industry into renewable resources, following the lead of Texas and 'green' countries like Sweden and Norway,[859] and indeed Denmark who plan to phase out fossil fuels completely by 2050,[860] highlighting that with commitment it is possible.

However this is a long term solution and it seems clear from Canada's past decisions surrounding this industry that this will not be an option until the oil runs dry. So what can be done to lessen environmental damage whilst still exploiting the reserves?

Mining and Transportation

[857] Ian Johnston, 'Solar panels surpass coal-fired electricity in previously 'unthinkable' feat', (The Independent: 2016) <http://www.independent.co.uk/environment/solar-panels-electricity-coal-power-stations-uk-sun-a7344326.html> accessed 26th November 2016
[858] Pilita Clark, 'Renewables overtake coal as world's largest source of power capacity', (The Financial Times: 2016) <https://www.ft.com/content/09a1f984-9a1d-11e6-8f9b-70e3cabccfae> accessed 26th November 2016
[859] Environmental Performance Index, 'Climate and Energy', (Yale University: 2016) <http://archive.epi.yale.edu/our-methods/climate-and-energy> accessed 27th November 2016
[860] Ibid

The majority of environmental issues stem from the mining process itself and the transportation of the oil so if these processes could be altered, this could reduce the negativity associated with this industry.

a) As discussed previously in this chapter, strip mining causes a host of environmental issues, with tailings ponds and large scale disruption of the environment being the main two. *In situ* mining is a tried and tested viable alternative. So a ban on strip mining would see oil companies forced to use *in situ* methods;
b) As a ban on strip mining would stop the creation of more tailings ponds, the focus could then shift to stabilising the current tailings ponds and reclaiming this land back to its original state.
c) It is widely accepted that CCS will reduce industrial CO_2 emissions from being released into the atmosphere. Legally enforcing CCS to reduce carbon emissions would see less emissions and cleaner and healthier air quality. Whilst there is a cost involved in implementing this technology the cost on the environment is far greater. This would apply to: all formation carbon dioxide (CO_2) from new natural gas processors; all process CO_2 from new hydrogen production facilities; and all combustion CO_2 from all new coal fired electricity plants, oil sands facilities, and upgraders.
d) Using environmentally friendly and more secure methods for transporting the oil will help to eliminate risks involved with transportation. Tailings sludge is kept on site adhering to the proximity principle as it is believed that risks are involved with transporting waste. However, if the methods were more secure, this waste could be taken to an alternative location for treatment. This in turn would reduce pollution of First Nation land and water sources and recycling would reduce further withdrawals.

Society, First Nations and Human Rights

e) Agree standards for future remediation to ensure that when the land is given back to First Nation communities it will be useable as it was previously. Ensure that sufficient funds are set aside to reclaim the land to its previous state and reclaim the land at the earliest opportunity to prevent contamination from seepage.

f) Establish an independent body to deal with all aboriginal claims. Ensure all breaches of treaty rights that are raised are compensated accordingly and issue injunctions.

g) Establish legislation to protect certain areas of public forest lands from industrial development. Protected areas should be developed and co-managed with Aboriginal peoples.

h) Introduce a tax or fund that oil corporations would contribute to from their profits to put towards remediation and investment in renewables for future generations.

Environment

i) Ensure areas near protected or endangered species, such as caribou, are covered in the legislated protected land.

j) Restrict drainage from the Athabasca River and ensure that water quality is tested to reduce risk of river pollution, thus reducing the impact of First Nations health and upholding their traditions. The low-flow threshold for the lower Athabasca River should be at least 100 $m^3 s^1$.

Improving Legal Policy

k) Establish penalties in line with individual accountability for not meeting GHG reduction targets under *Alberta's Climate Change Strategy*. If targets are missed the individual key decision makers shall be held accountable, not the corporations.

l) Criminalisation for missing targets will deter oil companies from polluting and encourage them to meet these targets, directed at the individual decision makers.

Technology

m) Ensure best available technology is used if successful in reducing emissions. Oil companies must use equipment with the lowest achievable emissions or to deploy best-available technology for air emissions reductions regardless of global oil prices.

n) Invest all funds from carbon taxes and from penalties from missing targets back in to the climate change and energy sector, for further research on renewable fuels and technology to stabilise waste from tailings ponds.

However, these recommendations are merely masking the problems instead of resolving the real issue. The glaringly obvious one being the illegality that comes hand in hand with the oil sands. Real solutions would be establishing a crime of ecocide, criminalising the offence and make polluters accountable to the law in order to cease production.[861] In a sustainable society, the oil sands would serve as an environmentally neutral small base energy load filling in for renewable energy shortfalls when necessary and would have a productive life span of

[861] Polly Higgins, 'Closing the door to dangerous industrial activity: A concept paper for governments to implement emergency measures' (Concept paper for all governments on the law of Ecocide. Submitted 21 March 2012) pg 8

centuries,[862] thus making them a sustainable, long-term source of energy, without shifting focus from the development of renewable energy.

[862] Canadians for a Sustainable Society, 'Oil Sands', (2017) < http://sustainablesociety.com/environment/oil-sands#.WH97y1OLTIU> accessed 18 January 2017

Overall Discussion

The current scale of land disruption is 1670 km^2, for both actively mined or approved development,[863] with a further 715 km^2 destroyed by mining and tailings ponds,[864] the level of habitat and ecosystem disturbance is unimaginable.[865] Unfortunately with expansion set to triple,[866] this will only worsen. Yet with CO_2 emissions from the oil sands worse than those emitted by coal[867] and oil prices in rapid decline (*see Figure 4*), it is important to note this industry no longer makes economic sense.[868] When balancing the oil sands low EROI[869] against the many negative environmental impacts caused by this industry as outlined throughout this thesis, surely a more suitable and sustainable alternative would be to invest in real, long-term, sustainable solutions. Using renewable energy and harnessing Canada's strong wind and solar

[863] R.C. Rooney, S.E. Bayley, D.S. Schindler, 'Oil sands mining and reclamation cause massive loss of peatland and stored carbon', Proc. Natl. Acad. Sci. U. S. A., 109 (2012), pp. 4933–4937

[864] Raab, D, & Bayley, S 2013, 'A Carex species-dominated marsh community represents the best short-term target for reclaiming wet meadow habitat following oil sands mining in Alberta, Canada', Ecological Engineering, 54, pp. 97-106, Environment Complete, EBSCOhost, viewed 27 November 2016.

[865] MacKinnon, M.D. and Retallack, J.T. In Land and Water Issues Related to Energy Development, Ann Arbor Science, Denver 1981; Verbeek, A. et al. In Proceedings of Oil Sands – Our Petroleum Future Conference, Edmonton, 1993; McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016;

[866] National Energy Board, 'Regulatory Agenda' (*National Energy Board*, January 2006) <http://publications.gc.ca/collections/Collection/NE12-4-2006-1E.pdf> accessed 19th November 2016

[867] Ibid.

[868] Jeff Rubin, 'Why the oil sands no longer make economic sense', (The Globe and Mail, November 2015) <http://www.theglobeandmail.com/report-on-business/rob-commentary/oil-sands-no-longer-make-economic-sense/article27170104/> accessed 30th January 2016

[869] David Hughes, 'Drill, Baby, Drill: Can Unconventional Fuels Usher in a New Era of Energy Abundance?', (Post Carbon Institute, February 2013) < http://www.postcarbon.org/publications/drill-baby-drill/> accessed 18th January 2017; Lambert et al., 2012

capabilities,[870] as opposed to risking the health,[871] traditions,[872] and rights[873] of aboriginal communities, would be more appropriate with modern environmental principles and legislation.

Indeed this industry is now in decline[874] and with many former oil sands employees now out of work,[875] and a risky basis of the Canadian economy, now is the time to review this industry in line with international principles of Sustainable Development and intergenerational equity. It is clear the 'balance' of the economy, society and the environment[876] in Canada is favouring the economy,[877] but it is even clearer that future generations have been forgotten entirely, making this industry incompatible with these key environmental principles. Yet with a lack of accountability and enforceability, there is no reason for Canada to review this environmentally damaging industry.

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[870] The Pembina Institute, 'Greening the Grid: Powering Alberta's Future with Renewable Energy', (The Pembina Institute. Fact Sheet) <https://www.pembina.org/reports/greeningthegrid-fs.pdf> accessed 15 October 2016

[871] Laura Westra, 'Environmental Justice and the Rights of Ecological Refugees', (Earthscan, 2009) pg 122; McLean L, Patel T. Racial and ethnic variations in the epidemiology of intrahepatic cholangiocarcinoma in the United States. Liver Int 2006; 26(9):1047-1053;

[872] Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014) pg 11

[873] Lizzie Gunggoll, 'Standing Our Sacred Ground – First Nations, Tribal Leaders & Land Owners Send Message To Canada, Stop Tar Sands At The Source', (First Peoples Worldwide, April 2014); Shawn Mccarthy, Why the oil sands matter to every Canadian (The Globe and Mail, October 28th 2014) < http://www.theglobeandmail.com/report-on-business/rob-magazine/why-the-oil-sands-matter-to-every-canadian/article21331322/> accessed 13th January 2016; Haida Nation v British Columbia (Ministry of Forests), 2004, Supreme Court of Canada 73; Taku River, Tlingit First Nation v British Columbia, 2004, Supreme Court of Canada 74.

[874] Jeff Rubin, 'Why the oil sands no longer make economic sense', (The Globe and Mail, November 2015) < http://www.theglobeandmail.com/report-on-business/rob-commentary/oil-sands-no-longer-make-economic-sense/article27170104/> accessed 30th January 2016

[875] Tracy Johnson, '2 years without a job: Calgary in the downturn', (CBC News: 2016) <http://www.cbc.ca/news/canada/calgary/calgary-unemployed-more-than-a-year-1.3769195> accessed 27th November 2016

[876] United Nations, (1987) Our Common Future - Brundtland Report.

[877] Bob Weber, 'Alberta failing aboriginal people in the oilsands area: Report' (The Canadian Press, Feb 2016); Alec Samuels, 'Sustainable development: what is it?', (J.P.L., 2013) pg 1374

Canada assert a commitment to Sustainable Development[878] yet this principle relies on a commitment to equity with future generations,[879] holding the earth and its resources in trust to be passed on to our descendants for their use.[880] However, future generations in Canada will receive a mass of disturbed land, polluted air, disturbed ecosystems and habitats, and insufficient and polluted river water, coupled with potential taxes to fund the clean-up of the previous generation, greatly undermining the principle of SD, intergenerational equity and the polluter pays principle. Of course if the damage could be 'undone' with remediation that would negate the negative burden left behind but with the effects of remediation a large scale experiment,[881] this not only undermines the precautionary principle, it also raises serious concerns as to the functionality of the land and ecosystems when production is complete.

It is unclear as to whether the First Nations will ever regain the full functionality of their land, despite being protected under treaty, or if they will have to adapt further to a new way of life[882]

[878] The Government of Canada, 'Sustainable Development', (Environment and Climate Change Canada, 2016) <https://www.ec.gc.ca/dd-sd/> accessed 30th January 2017
[879] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 19.
[880] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 20.
[881] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 30th January 2016
[882] Dr Pierre Gosselin et al, 'The Royal Society of Canada Expert Panel: Environmental and Health Impacts of Canada's Oil Sands Industry', (December 2010) pg 18

with continued fears of poisoned water,[883] rare cancers[884] and contaminated food.[885] Yet First Nations could make a claim against the state if they believe their rights to consultation were breached as confirmed in *Haida*[886] and *Taku*,[887] or they could claim against the state if the right to a heathy environment were impeded.[888] Whilst bringing a claim for breaches of these fundamental rights should be encouraged in the modern world, the notion of environmental justice could suggest while these claims seem somewhat unsuccessful in Canada,[889] or this could be due to fears of opening the floodgates.[890] Nonetheless, the opinion among the First Nations remains divided,[891] making it essential to have appropriate channels to seek change when

[883] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; MacKinnon, M.D. & Sethi, A. In Proceedings of Our Petrolium Future Conference, Alberta Oil Sands Technology and Research Authority, Edmonton, 1993; MacKinnon MD (1989) Development of the tailings pond at Syncrude's oil sands plat, 1978-1987. AOSTRA J Res 5:109–133.

[884] Danielle Droitsch and Terra Simieritsch, 'Canadian Aboriginal Concerns With Oil Sands: A compilation of key issues, resolutions and legal activities' (Briefing Note, September 2010) pg 1; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7; Irvine, G.M., Blais, J.M., Doyle, J.R., Kimpe, L.E., White, P.A., 'Cancer risk to First Nations' people from exposure to polycyclic aromatic hydrocarbons near in-situ bitumen extraction in Cold Lake, Alberta' (Environmental Health: A Global Access Science Source, 2014) 13 (1), 7

[885] Erik, W. A., Process water treatment in Canada's oil sands industry: I. Target pollutants and treatment objectives. (J. Environ. Eng. Sci., 2008) 7 135; Stéphane M. McLachlan, 'Environmental and Human Health Implications of the Athabasca Oil Sands for the Mikisew Cree First Nation and Athabasca Chipewyan First Nation in Northern Alberta', (Phase Two Report, July 2014)

[886] Haida Nation v British Columbia (Ministry of Forests), 2004, Supreme Court of Canada 73.

[887] Taku River, Tlingit First Nation v British Columbia, 2004, Supreme Court of Canada 74.

[888] Declaration of the United Nations Conference on the Human Environment, G.A. Res. 2997, princ. 21, U.N. GAOR, 27th Sess., U.N. Doc. A/ Conf.48/14/Rev/1, 11 I.L.M. 1416 (June 16, 1972) ("Stockholm Declaration"), Principle 1

[889] : Beverley Jacobs, 'ENVIRONMENTAL RACISM ON INDIGENOUS LANDS AND TERRITORIES', (May 2010) pg 10

[890] By allowing one individual a successful claim for a beach of their right to a healthy environment, this would be setting an international precident providing this as a legally enforceable right, potentially allowing all signatories to the Stockholm Declaration a remedy.

[891] The Fork McKay Group support the development with career prospects and opportunities benefitting them, yet Athabasca Chipewyan First Nations oppose the development due to the adverse environmental effects. Source: Conference in Fort McMurray, Alberta: Energy and the oil sands: Aboriginal perspectives. (Alberta: January 2014)

necessary. For this participation to be deemed successful, First Nations must be able to induce significant social reform[892] enabling them to halt or scale back production,[893] yet this will never be possible in this industry as there is too much at stake, thus their voices will never be heard, despite these communities being the most affected.

Yet it is not just the First Nations that are effected by the oil sands. The destruction of a hugely beneficial carbon sink[894] and rise in carbon emissions[895] makes this a global concern, not a national one, and a matter of ethics. There is a moral duty to protect resources and the planet and ensure there is sufficient benefit for future generations, and to understand that the Earth is not property that we own in line with the 'Earth Community' and wild law approach. Yet this is not the case. Provincial legislation sets out the 'ownership' of resources within Alberta, suggesting the Earth and environmental law is a matter for property law, undermining *Polly Higgins'* view, which sees the Earth as a benefit that we are protecting, not one that we own.[896]

Yet the *Yasuni Initiative* highlighted the main issue with the environment – it is not a big enough global concern,[897] therefore the only way that results can be achieved is to create individual accountability and criminalise the wrongdoing.[898] *Higgins'* proposals to create a crime of ecocide

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[892] S. Arnstein, 'A ladder of citizen participation', (Journal of the American Institute of Planners, 1969) 39 (4) pg. 216
[893] Evan Bowness and Mark Hudson, 'Sand in the cogs? Power and public participation in the Alberta tar sands, (Environmental politics, 2014) 23 (1) pg 62
[894] Webber, M.G., and Flannigan, M.D. 1997. Canadian boreal forest ecosystem structure and function in a changing climate: impact on fire regimes. Environ. Rev. 5: 145–166. doi:10.1139/a97-008
[895] Dan Woynillowicz, 'Tar Sands Fever!' (WorldWatch Institute, Sep/Oct 2007, Volume 20, No. 5) <http://www.worldwatch.org/node/5287> accessed 12th January 2016
[896] Edith Brown-Weiss, In Fairness To Future Generations and Sustainable Development', AM. U.J. INT'L L. & POL'Y (1990), 8 (19) pg 8; Polly Higgins, 'Rome Statute', (Eradicating Ecocide: 2010-2015) <http://eradicatingecocide.com/the-law/rome-statute/> last accessed 9 September 2016.
[897] John Vidal, 'Ecuador drills for oil on edge of pristine rainforest in Yasuni' (The Guardian, April 2016)
[898] Polly Higgins, 'Rome Statute', (Eradicating Ecocide: 2010-2015) <http://eradicatingecocide.com/the-law/rome-statute/> last accessed 9 September 2016.

will achieve just this, establishing pre-emptive, preventative and proactive approach, allowing for action to be taken before the damage is done.[899] This in turn would adhere to the precautionary principle, thus creating a more effective basis for environmental law.

That being said, environmental law is based on science, which makes it subjective and ever changing, but it is hard to accommodate those changing standards. Further, often the opinions of scientists are based on current understanding and knowledge, which is subject to change, making it hard to know what acceptable environmental law should be. Therefore the Brundtland definition of Sustainable Development and *Edith Brown-Weiss'* views on intergeneration equity provide a widely accepted foundation of environmental law, and should therefore be used as a basis for national and provincial law. The Earth is not being passed on to future generations in an equivalent manner to how it was received, thus there is no equity between generations; therefore, the 'sustainability' of this industry cannot be ensured.[900]

In the case of the oil sands, commitment to these key environmental principles and national and international treaties has been undermined, highlighting where Canada's priorities lie, however technology could be a potential solution to 'green' this industry.[901] Whilst investing in technology could indeed provide a means to utilise the existing oil reserves in Alberta without the emissions, this does not provide a remedy for the disturbed land for future generations, the

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[899] Ibid

[900] Virginie Barral, 'Sustainable development in international law: nature and operation of an evolutive legal norm', E.J.I.L. 2012, 23 (2), 381

[901] David McColl, 'Green Bitumen: The Role of Nuclear, Gasification and CCS in Alberta's Oil Sands'. (Canadian Energy Research Institute: Summary Report. 2009); SRCCS, 2005. In: Metz, B., Davidson, O., de Coninck, H., Meyer. L. (Eds.), IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA; K. van Alphen, Q. van Voorst tot Voorst, M.P. Hekkert, R. Smits, 'Societal acceptance of carbon capture and storage technologies', Energy Policy, 35 (2007), pp. 4368–4380; The Economist, 'The steam from below', (Print Edition: Science and technology. Sep 2015)

clean-up costs, not to mention the health concerns and habitat and ecosystem disturbance. The damage has already been done and finding a way to capture and store carbon will not provide a remedy for this.

It may be too late to undo the seepage from the tailings ponds[902] and contamination of the land,[903] and too late to undo the pollution and excessive withdrawals[904] of the Athabasca river[905] and deaths of waterfowl and migratory birds,[906] but it is not too late to halt production and shift the focus back to renewable energy where arguably it should be in a westernised country in modern society, and ensure no further damage occurs to the land and First Nations. The only way to successfully achieve this is to change attitudes and criminalise the behaviour, holding either the polluters to account.

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[902] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[903] Ibid

[904] Investing In Our Future: Responding to the Rapid Growth of Oil Sands Development, Doug Radke, December 29,2006, p.112, p.133.

[905] McNeill, S, Arens, C, Hogan, N, Köllner, B, & van den Heuvel, M 2012, 'Immunological impacts of oil sands-affected waters on rainbow trout evaluated using an in situ exposure', Ecotoxicology & Environmental Safety, 84, pp. 254-261, Environment Complete, EBSCOhost, viewed 25 March 2016; Elaine MacDonald, Oilsands pollution and the Athabasca River: Modelling particulate matter deposition near Alberta's largest free-flowing river, (Ecojustice, March 2013) pg 2; Kelly, E.N.; Short, J.W.; Schindler, D.W.; Hodson, P.V.; Ma, M; Kwan, A.K.; and Fortin, B.L. Oil sands development contributes polycyclic organic compounds to the Athabasca River and its tributaries. Proceedings of the National Academy of Sciences of the United States of America. 2009, 106 (52).

[906] Shawn Mccarthy & Kelly Cryderman, 'Oil sands pollutants contaminate traditional First Nations' foods: report', (The Globe and Mail, July 2014) <http://www.theglobeandmail.com/news/national/oil-sands-pollutants-affect-first-nations-diets-according-to-study/article19484551/> accessed 21 May 2016; Jeff Wells, 'Danger in the Nursery: Impact on birds of tar sands oil development in Canada's Boreal forest', (NRDC, December 2008) pg 4

Conclusions

This research has found the Canadian oil sands industry to be entirely unsustainable and no longer economical, thus undermining the environmental principle of Sustainable Development. The methods used to extract the bitumen from the oil sands are outdated, hugely expensive and no longer feasible, leaving a negative environmental burden on future generations, and the suggested alternatives are not much better. In order to be considered sustainable, the long-term consequences of human activity on the planet need to be considered and with the long term effects unknown, and the effects of remediation unknown, the sustainability element of SD cannot be met. Further, the lack of equity between generations is also incompatible with SD, although this notion does see the Earth as a matter of property and ownership as opposed to one of ethics and morals.

The oil sands industry is leaving a host of unrectifiable environmental issues in its wake, including destruction of ecosystems, habitats, farmland and land protected under treaty, loss of biodiversity, damaging levels of emissions in the air and pollution and contamination of the Athabasca River. In turn, these environmental issues are impacting the health of the local First Nation communities and wildlife, directly contradicting the intentions of international, national and provincial environmental laws and principles.

Furthermore, not only is the health of the First Nations affected but also their rights which were allegedly protected under treaty. By using the rider clauses applied to *The Numbered Treaties*, the Alberta Government are not technically in breach of these treaties but nonetheless, First Nation communities have had their traditional way of life taken from them, their land, and their ability to hunt, fish and survive. Whilst there is no specified right to a healthy environment, there

is a right to life and with the health issues that can be attributed to this industry, the First Nations communities do not even have that.

These are communities that have their unique traditions and rights protected by the Crown throughout history and should continue to have this protection, however the rider clauses attached to the Numbered Treaties have allowed 'taking-up' of the land for mining, undermining these rights. Furthermore, deviation from these rights must involve establishing a compelling and substantial objective consistent with the Crown's fiduciary obligations to Indigenous peoples, however 'taking up' the land so that it cannot be used for hunting and trapping, for an undetermined amount of time, with the long-term implications untested, can in no way be aligned with the Crown's fiduciary obligations which guarantee the opposite for these communities.

It is not just their rights that have been affected by this industry. Carbon emissions are a global concern, not just a local one, for current and future generations. The Earth that is being left behind for future generations to deal with in the oil sands region is not the same as it was before the oil, the damage has already been done and with such a small percentage of the land reclaimed, and no guidelines for remediation, it is unclear what future generations will be left to clean up. Not to mention the clean-up costs themselves. These will most likely be funded by the tax payers of the current and future generations, grossly undermining the polluter pays principle and the intergenerational elements of SD.

Unfortunately it is forgotten that the Earth does not belong to us. The principles of Sustainable Development and intergenerational equity highlight that we are supposed to be protectors of the Earth, holding it in trust for future generations to also enjoy the benefits. If these principles were legally binding then the oil sands industry would have a lot to answer for. However, the

lack of enforceability of environmental law will allow Canada to continue destroying the Earth for an industry that is no longer profitable.

The lack of enforceability and accountability is a major setback for environmental law generally. In order to achieve effective international environmental law, current law needs to be consolidated and made clear, concise and transparent, thus ensuring compatibility with the rule of law. Indeed sustainable development, a core pillar of environmental law, does not have a clear and concise definition. In order to respond effectively to climate change, there needs to be a simplification and consolidation of the legal system, creating new laws that are orientated towards commitment to the community of life as a whole. *Cullinan* suggests when this gap has been filled, symptoms such as climate change will begin to disappear. *Carson* argued that these concerns are global, therefore the most effective way to implement these changes would be at an international level, adopting a top-down approach.

However, issues arise with international environmental law as states currently do not answer to anyone unless they choose to, and in the same vein, they can therefore choose not to. Kyoto is the prime example of this, as instead of facing the consequences as a result of not meeting their targets, Canada decided to opt out to avoid the financial penalties; they were able to do so with no repercussions. However, if ecocide was to amount to a crime against peace, states would be answerable to the International Criminal Court, providing an overarching regulator for matters that are of a global concern. This would indeed tie in with natural law and the notion that these crimes are known to be wrong, despite there being no legislation to prohibit it at a national level. It could be argued that this undermines the rule of law as there is no transparency if these laws do not exist, however SD is written into the majority of legal systems now and it certainly is

within the Canadian legal system, highlighting that the general principles are already widely accepted and therefore are transparent.

Whilst Ecocide could provide a remedy, it would be imperative to adopt an individual accountability model to act as a deterrent. Currently, decision makers in larger oil companies have no liability for decisions they make that negatively affect the world, and they are able to hide behind their corporations when they break the law. Often, the fines and penalties that are imposed on these organisations do not outweigh the benefit that breaking the law will bring and currently, the most common form of relief is injunctive. Whilst an injunction could prohibit an organisation from doing further damage, often injunctions are issued after the damage is done in order to prevent something from happening again, which is not in line with general deterrence.

Preventing further environmental damage as a result of the oil sands industry is necessary so although injunctions may provide a way to stop the situation worsening, in order to provide a new framework for environmental law, a more preventative approach would be to hold the individual decision makers to account for breaching a duty of care to both current and future generations. This tort, criminal model, would fall under 'general deterrence', preventing environmental crimes before they have happened. This would create a proactive, preventative model of environmental law, in line with *Higgins*' approach and in line with the Canadian justice system.

However, as technology advances, discovering ways to make the oil sands cheaper to extract, creating less waste and utilising the waste, and catching and storing carbon emissions would provide a more environmentally friendly and cost effective way to exploit the oil sands, thus leading to a dramatic increase in production. What would happen if the environment were given

legal standing as discussed in *Sierra Club v Morton*? This would naturally be a massive shift from how the environment is recognised at present and would be more in line with the 'holon' approach which suggests that the Earth is no more or less important than its inhabitants, so why should it not have the same legal standing? If this approach were to be incorporated into our legal system, *Higgins'* approach to protect the earth from large scale ecosystem disturbance could indeed become a reality for the oil sands industry, with environmentalists representing and defending the environment from further degradation. This would support Douglas J who argued there should be a federal rule that allowed environmental issues to be litigated in the name of an inanimate object about to be despoiled or defaced; in this case the boreal forest, the Athabasca River, the land itself or the animals could be the subjects, challenging oil companies for their right to exist.

Real solutions such as a tort for environmental law, adopting a crime of ecocide, criminalising destruction of the planet or giving the planet legal standing are the only options left. Using technology to create 'less-harmful' methods of extracting the oil, or introducing taxes and levy's to fund clean-up and invest in renewables, is simply diluting the issue. Alternative means of extracting the oil, such as steam, come with their own setbacks and imposing taxes is essentially permitting the damage to occur at a cost, so the oil must remain in the ground and focus must shift to less environmentally damaging and more sustainable means of energy, ones that will have longevity and a higher EROI than the oil sands, without the negative impacts on the environment and on health.

Alberta has some of the best wind and solar resources in the world, which are more than capable of meeting future demand in the province, which *Greenpeace* argue will address the threats of climate change, create jobs and allow Alberta to be a leader, without sacrificing health or

environment to do it. These options have a higher and therefore more economically viable EROI compared with the oil sands so best practise would be to invest in these long-term, sustainable sources of energy.

In order to achieve these important changes, attitudes need to shift towards the 'holon' approach, establishing a mutual respect for the planet and all of its inhabitants. By accepting the planet as a entity on the same level as humans would result in legal standing for living inanimate objects on the planet, and the Earth itself, providing them with protection and rights. Whilst this is a long way off, *Higgins'* campaign and discussions surrounding ecocide, the comments made in *Sierra Club v Morton* and the wider knowledge and understanding of what emissions, pollution and environmental degradation is doing to the planet, this is certainly a step in the right direction towards criminalising the oil sands industry, preventing further development and holding individuals to account for the damage that has been done and the laws that have been broken.

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