POSITION STATEMENT

The Environmental Goals and Climate Change Reduction Act

Tourism Industry Association of Nova Scotia (TIANS) Supportive of Bill 57 - Calls for Immediate Advancement of Lahey Report Recommendations.

The Tourism Industry Association of Nova Scotia (TIANS) applauds the provincial government on taking swift and decisive action to implement new legislation through Bill 57 with ambitious goals focused on environmental protection.

A healthy tourism industry is integrally linked with a healthy environment. Adventure and recreational based activities are the fastest growing sectors of the tourism economy, which pre- Covid-19 generated $2.7 billion in revenue and generated over $400 million in tax. People are seeking destinations that value and demonstrate environmental stewardship.

The proposed 20% land and water conservation goal identified in the Bill within the next eight years is significant and will support Nova Scotia's long-term sustainability; and, support the Nova Scotia brand as a clean and pristine destination to attract visitors and new investment in the province.

With regards to Section 10 (c) of the proposed Bill, TIANS urges an escalated timeline on the adoption of the forestry management reforms called for in the Lahey Report. To delay this work as proposed in the Bill, is a disservice to all involved. The Lahey Report addresses a number of elements contained in Bill 57 and yet has been languishing for three years awaiting any substantive advancement; reminiscent of other reports such as the "The Path We Share". Lahey's recommendations need to be advanced now, or at the very least a moratorium needs to be placed on Crown land harvesting until any new regulations are ready to be implemented.

As we embark in a post-pandemic era, the value of our environment has never been more obvious and the need for protection more crucial. Nova Scotia is blessed with incredible natural assets. As we begin the rebuild of the tourism economy, how we manage public policy around the environment will play a critical and defining role in our collective success.

The government today has an opportunity to demonstrate significant leadership on this file, however, it has to be measured in action. We have had numerous reports and little progress, Bill 57 provides a call for a new way forward that will be a legacy for all Nova Scotians.

Respectfully Submitted
TIANS – November 1, 2021
Contact: Lisa Dahr Ph: 902-423-4480
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Atlantic Salmon Federation  Fédération du Saumon Atlantique

November 1, 2021

The Honourable Brad James, M.L.A.
Chair of Law Amendments Committee
Province House,
Halifax, Nova Scotia

Dear Sir,

I am writing to you and the law amendments committee with respect to Bill No 57: Environmental Goals and Climate Change Reduction Act as a Nova Scotia citizen and on behalf of the Atlantic Salmon Federation (ASF).

ASF would like to express our support of this Bill as it is a very positive step forward for Nova Scotia. As you are aware we are in midst of a climate crisis that is threatening our species and important resources. By introducing this legislation, the NS Government is recognizing the severity of the crisis and is making serious commitments to address the situation. We are particularly happy to see the inclusion of water in the commitment to protect 20% of lands and water by 2030, the commitment to update the provincial environmental assessment process, and the commitment to implement an ecological forestry approach on Crown Lands. We are also glad that effort is being made in this bill "to promote and support climate change education and sustainability through the knowledge and teachings of Netukulimk and environmental stewardship with ongoing curricula renewal, the development of inclusive and accessible resources and professional learning that incorporates diversity and honours Etuaptmumk"

While we are overall supportive of the Bill, we would like to see several clarifications or amendments made prior to its final approval. The commitment to move away from coal to renewable energy is admirable but we are concerned as some forms of renewable energy, such as certain forms of hydroelectric and tidal power, can be very problematic for aquatic species. We would like to see that the commitment to renewable energy be better defined to ensure that these energy sources are ecologically sustainable.

We also applaud the government's commitment in this Bill to improve the aquaculture licensing process and provincial regulations to better consider environmental impacts. However, we are very concerned and disappointed that there is no language in the Bill to support moving away from the practice of open net pen aquaculture. Open net pen aquaculture has been scientifically shown to have negative impacts on wild Atlantic Salmon and coastal ecosystems. Other jurisdictions have recognized these impacts and are moving to remove this practice from their waters as part of their

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environmental and sustainability goals. We feel strongly that open net pen aquaculture cannot be considered low-impact sustainable aquaculture like certain land based and closed containment alternatives. We would like to see the Bill revised to include a commitment to transition away from open net pen aquaculture and to support other more environmentally sustainable aquaculture operations, several of which already exist in NS.

We were also disappointed that the Bill did not have any specific language pertaining to high impact industries such as open pit gold mining. These industries pose significant and persistent risks to aquatic life and are huge emitters of green house gases. We feel that their omission from the Bill runs counter to the commitments to reduce green house gases and move to net zero emissions. Given the potential impacts of this industry we would like to see the Bill express goals for the mining industry like it does for the forestry and energy sectors.

The commitment to implement an ecological forestry approach and the 2018 Lahey report are strong commitments that we are happy to see included in this Bill. However, we do not understand why there is a need for a two-year delay in implementation on Crown lands. We were also surprised that the Bill did address forestry on private lands. Approximately 70% of all land in NS is privately owned, so to make significant progress towards environmental goals and reduce climate change impacts, effort need to be made to address forestry on private lands. We would like this Bill to be revised to reflect this fact and to commit to developing a pathway to address forestry on private lands.

Despite our concerns and reservations, we want to emphasis that we are supportive of this Bill and are pleased that the NS Government is making serious commitments to protects our resources and address climate change. Thank-you for showing leadership on this issue. If you have any questions about this submission, then please do not hesitate to reach out to me.

Yours sincerely,

Kris Hunter
Program Director for Nova Scotia and Prince Edward Island
Atlantic Salmon Federation

cc
Honourable Tim Halman, Minister of Environment and Climate Change

About ASF:

The Atlantic Salmon Federation (ASF) is an international conservation organization established in 1948. The Federation is dedicated to the conservation, protection and restoration of wild Atlantic salmon and the ecosystems on which their wellbeing and survival depend.

ASF's headquarters are in St. Andrews, New Brunswick, Canada, with regional offices in each of the Atlantic provinces, Quebec, and Maine.

ASF has a network of six regional councils (New Brunswick, Nova Scotia, Newfoundland and Labrador, Prince Edward Island, Quebec, and Maine), which cover the freshwater range of wild Atlantic salmon in Canada and the United States.

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Overview of the Impacts of Salmon Farms on Wild Atlantic Salmon Populations

Growing domesticated salmon in sea cages in areas where there are wild Atlantic salmon invariably has negative impacts on local wild populations. These negative impacts have been well established by scientific studies (ICES 2016; Hutchinson 2006; Ford and Myers 2008). Salmon farms have been shown to impact wild Atlantic salmon populations in several ways which are briefly summarized here:

- **Farmed salmon escape and interbreed with wild populations**. Farmed Atlantic salmon have been selectively bred to improve commercially important traits (i.e. growth, feed utilization, filet quality) which results in them being poorly adapted to the natural environment (Solberg et al. 2013; Wacker et al. 2021). When farmed salmon escape and interbreed with wild salmon, the resulting offspring are genetically inferior to wild salmon and are therefore less fit for life in the wild (Flemming et al. 2000; McGinnity et al. 2003; Bourrett et al. 2011; DFO 2013b).

  Escaped farmed salmon have been observed in rivers in all regions where salmon farming occurs (Thorstad et al. 2008). Some estimates suggest the annual number of escapes from salmon farms in the North Atlantic may outnumber the total population of adult wild Atlantic salmon (Glover et al. 2017). Large-scale studies in Norway (Glover et al. 2013; Karlsson et al. 2016) and Canada (Wringe et al. 2018; Bradbury et al. 2020a) have demonstrated the significant extent to which interbreeding can occur when salmon farming overlaps with wild populations.

  The viability and recovery of wild Atlantic salmon populations is threatened by the introduction of genetic material (i.e., genetic introgression) from farmed fish (Glover et al. 2020; Wacker et al. 2021). Long-term population level consequences of introgression include erosion of genetic diversity, reduced productivity, decreased resilience, and declining abundance (Hindar et al. 2006; Glover et al. 2017; Skaala et al. 2012, 2019; Sylvester et al. 2019). Several studies have demonstrated a decrease in the total productivity of wild salmon following introgression of farmed salmon genes (Fleming et al. 2000; McGinnity et al. 1997; McGinnity et al. 2003; Wacker et al. 2021).

- **Sea lice proliferate in salmon farms and are transmitted to wild fish.** Sea lice are a naturally occurring parasite on wild Atlantic salmon. When farmed salmon are stocked into open net pens they pick up sea lice from the environment which leads to frequent infestations and outbreaks within the farm. This increases the abundance of sea lice in the local area which has been demonstrated to increase the abundance of lice on wild salmon (Frazer 2009) and to increase mortality (especially of smolts) in wild populations (Krkosek et al., 2007; Thorstad et al. 2015).

  Numerous studies have demonstrated a link between salmon aquaculture and sea lice infestations on wild salmonids (Helland et al. 2012, 2015; Middlemas et al., 2010, 2013; Serra-Llinares et al. 2014). Elevated levels of sea lice on wild salmonids have been found up to 30km from salmon farms (Thorstad et al. 2015). Smolt mortality attributable to salmon lice has been demonstrated to result in a significant reduction in adult returns (Shepherd and Gargan 2017) and to influence the achievement of conservation requirements for affected stocks (Gargan et al. 2012, Krkošek et al. 2013; Shepherd and Gargan 2017). Sea lice infestation also imposes sub-lethal physiological impacts, including reduced swimming speed (Wagner et al., 2003), osmoregulatory failure (Grimnes and Jakobsen, 1996;) and slower post-smolt growth (Skilbrei and Wennevik, 2006; Skilbrei et al., 2013).

- **Salmon farms and escaped fish have negative ecological interactions with wild salmon.** These interactions include interfering with mating and competition for food and space (Naylor et al. 2005) and escapees spreading parasites and diseases to wild fish (Naylor et al. 2005; Krkosek et al., 2006; Krkosek et al., 2007). These interactions can lead to changes in productivity of native

salmon populations through processes affecting growth and survival (Lacroix and Flemming, 1998; Hindar and Flemming, 2007).

- **Diseases and pathogens proliferate in salmon farms and are transmitted to wild fish.** The Atlantic salmon farming industry has the capacity to play a central role in transportation and transmission of pathogens to wild salmon (Garseth et al. 2013). Transmission of pathogens and diseases from aquaculture to wild fish can occur through populations that are infected at the hatchery source, through infected escapees, and through wild fish migrating or moving within plumes of an infected pen or disease outbreak (Madhun et al. 2015; Naylor et al. 2005; Johnsen and Jensen 1994). There is a continual emergence of viruses in net-pen salmon aquaculture (Kibenge 2019) prompting increasing concern about the impacts of these diseases on wild Atlantic salmon populations and other marine wildlife (Bouwmeester et al. 2021).
- **Salmon farms alter the local environment thereby changing the selective pressures to which locally-adapted wild populations are subject.** Changes in selective pressures can lead to decreased survival, reductions in population size, increased genetic drift, and a lowering of long-term adaptive capacity in wild populations (Ferguson et al. 2007; Verspoor et al. 2015; DFO 2013b). Bradbury et al. (2020b) identified several examples of altered selective landscapes and genetic changes in wild salmon resulting from ecological processes associated with salmon farming, predominately through pathogen or parasite transmission leading to reductions in wild population abundance.

Collectively, these impacts have been correlated with significant declines in wild salmon populations. A global study by scientists at Dalhousie University found a reduction in survival or abundance of wild populations (of both salmon and sea trout) of more than 50% per generation on average, associated with salmon farming (Ford and Myers 2008). Such declines have significant social and economic impacts as recreational, commercial, and First Nations fisheries are reduced or eliminated (Wiber 2012; Naylor et al. 2005). Naylor et al. (2005) conclude that risks to wild populations, ecosystems, and society are highest where salmon are farmed in their native range, when large numbers of salmon are farmed near small natural populations, and when exotic pathogens are introduced with farmed fish.

References

Bouwmeester, MM, Goedknegt, MA, Poulin, R, Thieltges, DW. 2021. Collateral diseases: Aquaculture impacts on wildlife infections. *J Appl Ecol*. 2021; 58: 453– 464.

Bourret V, O'Reilly PT, Carr JW, Berg PR, Bernatchez L. 2011. Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon (Salmo salar) population following introgression by farmed escapees. Heredity, 106, 500–510.

Bradbury IR, Duffy S, Lehnert SJ, Jóhannsson R, et al. 2020a. Model-based evaluation of the genetic impacts of farm-escaped Atlantic salmon on wild populations. Aquacult Environ Interact 12:45-59.

Bradbury IR, Burgetz I, Coulson MW, Verspoor E, et al. 2020b. Beyond hybridization: the genetic impacts of nonreproductive ecological interactions of salmon aquaculture on wild populations. Aquacult Environ Interact 12:429-445.

Ferguson A., et al., editors. 2007. The Atlantic Salmon: Genetics, Conservation and Management. Blackwell, Oxford.

Fleming, IA, Hindar, K, Mjolnerod, IB, Jonsson, B, Balstad, T, and Lamberg, A. 2000. Lifetime success and interactions of farm salmon invading a native population. Proceedings of the Royal Society of London Series B-Biological Sciences, 267: 1517-1523.

Ford J.S., Myers R.A. 2008. A global assessment of salmon aquaculture impacts on wild salmonids. PLoS Biol 6(2)

Frazer L. 2009. Sea-cage aquaculture, sea lice, and declines of wild fish. Conservation Biology, 23: 599–607.

Gargan, P.G., Forde, G., Hazon, N.F., Russell, D.J., and Todd, C.D. 2012. Evidence for sea lice-induced marine mortality of Atlantic salmon (Salmo salar) in western Ireland from experimental releases of ranched smolts treated with emamectin benzoate. Canadian Journal of Fish and Aquatic Sciences, 69: 343-353.

Garseth ÅH, Ekrem T, Biering E. 2013. Phylogenetic Evidence of Long Distance Dispersal and Transmission of Piscine Reovirus (PRV) between Farmed and Wild Atlantic Salmon. PLoS ONE 8(12)

Glover, K.A., Pertoldi, C., Besnier, F., Wennevik, V., Kent, M., and Skaala, Ø. 2013. Atlantic salmon populations invaded by farmed escapees: quantifying genetic introgression with a Bayesian approach and SNPs. BMC Genetics, 14:4.

Glover, KA, Solberg, MF, McGinnity, P, et al. 2017. Half a century of genetic interaction between farmed and wild Atlantic salmon: Status of knowledge and unanswered questions. *Fish Fish*.; 18: 890–927.

Glover, K.A., Wennevik, V., Hindar, K., Skaala, Ø., Fiske, P., Solberg, M. F., Diserud, O. H., Svåsand, T., Karlsson, S., Andersen, L. B., & Grefsrud, E. S. 2020. The future looks like the past: Introgression of domesticated Atlantic salmon escapees in a risk assessment framework. *Fish and Fisheries*, 21(6), 1077– 1091

Grimnes A., Jakobsen P.J. 1996. The physiological effects of salmon lice infection on post-smolt of Atlantic salmon. Journal of Fish Biology, 48: 1179–1194.

Helland, I.P., Finstad, B., Uglem, I., Diserud, O.H., Foldvik, A., Hanssen, F., Bjørn, P.A., et al. 2012. What determines salmon lice infections on wild salmonids? Statistical calculations of data from the national salmon lice surveillance program 2004–2010 (in Norwegian). NINA Report, 891. 51 pp.

Helland, I.P., Uglem, I., Jansen, P.A., Diserud, O, H., Bjørn, P.A., and Finstad, B. 2015. Statistical and ecological challenges of monitoring parasitic sea lice infestations in wild salmonid fish stocks. Aquaculture Environment Interactions, 7: 267-280.

Hindar K, Fleming IA. 2007. Behavioral and genetic interactions between escaped farm salmon and wild Atlantic salmon. In: Bert TM, ed. Ecological and genetic implications of aquaculture activities. Berlin: Springer, pp. 115–122.

Hindar, K., Fleming, I., McGinnity, P., Diserud, O. 2006. Genetic and ecological effects of salmon farming on wild salmon: modelling from experimental results, *ICES Journal of Marine Science*, Volume 63(7): 1234–1247

Hutchinson P. 2006. Interactions between aquaculture and wild stocks of Atlantic salmon and other diadromous fish species: science and management, challenges and solutions. Proceedings of an ICES/NASCO Symposium held in Bergen, Norway, 18–21 October 2005. ICES J Mar Sci 63:(7).

ICES. 2016. Report of the Workshop to address the NASCO request for advice on possible effects of salmonid aquaculture on wild Atlantic salmon populations in the North Atlantic (WKCULEF), 1–3 March 2016, Charlottenlund, Denmark. ICES CM 2016/ACOM:42. 44 pp.

Johnsen B.O. and Jensen A.J. 1994. The spread of furunculosis among salmonids in Norweigan rivers. J Fish Biol 45: 47–55

Karlsson, S., Diserud, O.H., Fiske, P., and Hindar, K. 2016. Widespread genetic introgression of escaped farmed Atlantic salmon in wild salmon populations. *ICES Journal of Marine Science*, 73(10), 2488–2498

Kibenge, F.S.B. 2019. Emerging viruses in aquaculture. Current Opinions in Virology 34: 97-103.

Krkosek, M., J. Ford, A. Morton, S. Lele, R.A. Myers, and M. Lewis. 2007. Declining wild salmon populations in relation to parasites from farm salmon. Science 318, 1772-1775.

Krkosek, M., et al. 2006. Epizootics of wild fish induced by farm fish. Proceedings of the National Academy of Sciences of the USA. 103, 15506-15510.

Krkošek, M., Revie, C.W., Gargan, P.G., Skilbrei, O.T., Finstad, B., and Todd, C.D. 2013. Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean. Proceedings of the Royal Society B: Biological Sciences 280: 20122359.

Lacroix, G. and I.A. Flemming. 1998. Ecological and Behavioural Interactions Between Farmed and Wild Atlantic Salmon: Consequences for Wild Salmon. Canadian Stock Assessment Secretariat Research Document 98/162.

Madhun, A.S., et al. 2015. Potential disease interaction reinforced: Double-virus-infected escaped farmed Atlantic salmon, *Salmo salar* L., recaptured in a nearby river. *Journal of Fish Diseases*, 38, 209–219.

McGinnity, P., Stone, C., Taggart, J. B., Cooke, D., Cotter, D., Hynes, R., McCamley, C., et al. 1997. Genetic impact of escaped farmed Atlantic salmon (Salmo salar L.) on native populations: use of DNA profiling to assess freshwater performance of wild, farmed, and hybrid progeny in a natural river environment. ICES Journal of Marine Science, 54: 998-1008.

McGinnity P, et al. 2003. Fitness reduction and potential extinction of wild populations of Atlantic salmon, Salmo salar, as a result of interactions with escaped farm salmon. Proc R Soc Lond B Biol Sci 270: 2443–2450

Middlemas, S.J., Raffell, J.A., Hay, D.W., Hatton-Ellis, M. and Armstrong, J.D. 2010. Temporal and spatial patterns of sea lice levels on sea trout in western Scotland in relation to fish farm production cycles. Biology Letters 6, 548–551.

Middlemas, S.J., Fryer, R.J., Tulett, D. & Armstrong, J.D. 2013. Relationship between sea lice levels on sea trout and fish farm activity in western Scotland. Fisheries Management and Ecology, 20: 68–74.

Naylor R. et al. 2005. Fugitive salmon: assessing risks of escaped fish from aquaculture. BioScience 55:427-437.

Serra-Llinares, R.M., Bjørn, P.A., Finstad, B., Nilsen, R., Harbitz, A., Berg, M. & Asplin, L. 2014. Salmon lice infection on wild salmonids in marine protected areas: an evaluation of the Norwegian 'National Salmon Fjords'. Aquaculture Environment Interactions, 5, 1-16.

Shephard S, Gargan P. 2017. Quantifying the contribution of sea lice from aquaculture to declining annual returns in a wild Atlantic salmon population. Aquaculture Environment Interactions 9:181-192.

Skaala, Ø., Glover, K.A., Barlaup, B.T., Svåsand, T., Besnier, F., Hansen M.M., Borgstrøm R. 2012. Performance of farmed, hybrids, and wild Atlantic salmon (*Salmo salar*) families in a natural river environment. Canadian Journal of Fisheries and Aquatic Science, 69: 1994–2006.

Skaala, Ø., et al. 2019. An extensive common-garden study with domesticated and wild Atlantic salmon in the wild reveals impact on smolt production and shifts in fitness traits. *Evolutionary Applications*, 12, 1– 16.

Skilbrei O.T., Wennevik V. 2006. Survival and growth of sea-ranched Atlantic salmon, *Salmo salar* L., treated against sea lice before release. ICES Journal of Marine Science, 63: 1317–1325.

Skilbrei O.T., Finstad B., Urdal K., Bakke G., Kroglund F., Strand R. 2013. Impact of early salmon louse, *Lepeophtheirus salmonis*, infestation and differences in survival and marine growth of sea-ranched Atlantic salmon, *Salmo salar* L., smolts 1997-2009. Journal of Fish Diseases, 36: 249–260.

Solberg MF, Skaala Ø, Nilsen F, Glover KA. 2013. Does Domestication Cause Changes in Growth Reaction Norms? A Study of Farmed, Wild and Hybrid Atlantic Salmon Families Exposed to Environmental Stress. PLoS ONE 8(1): e54469.

Sylvester, E.V.A, B.F. Wringe, S.J. Duffy, L.C. Hamilton, I.A. Fleming, M.Castellani, P.Bentzen, I.R. Bradbury. 2019. Estimating the relative fitness of escaped farmed salmon offspring in the wild and modelling the consequences of invasion for wild population. Evolutionary Applications 12(4): 705-717.

Thorstad, E.B., et al. 2008. Incidence and impacts of escaped farmed Atlantic salmon Salmo salar in nature. NINA Special Report 36. 110 pp. https://www.nina.no/archive/nina/PppBasePdf/temahefte/036.pdf

Thorstad, E.B. et al. 2015. Effects of salmon lice Lepeophtheirus salmonis on wild sea trout Salmo trutta — a literature review. Aquaculture Environment Interactions 7: 91–113.

Verspoor, E., et al. 2015. The potential direct and indirect genetic consequences for native Newfoundland Atlantic Salmon from interbreeding with European-origin farm escapes. DFO Can. Sci. Advis. Sec. Res. Doc. 2015/030.

Wacker, S, Aronsen, T, Karlsson, S, et al. 2021. Selection against individuals from genetic introgression of escaped farmed salmon in a natural population of Atlantic salmon. *Evol Appl*.

Wagner G. N., McKinley R. S., Bjørn P. A., Finstad B. 2003. Physiological impact of sea lice on swimming performance of Atlantic salmon. Journal of Fish Biology, 62: 1000–1009.

Wiber et al. 2012. Impact of Aquaculture on Commercial Fisheries: Fishermen's Local Ecological Knowledge. Human Ecology Volume 40, Issue 1, pp 29-40

Wringe, B.F., Jeffery, N.W., Stanley, R.R.E. *et al.* 2018. Extensive hybridization following a large escape of domesticated Atlantic salmon in the Northwest Atlantic. *Commun Biol* **1,** 108.

ecelaw
east coast environmental law

To: The Law Amendments Committee of the Nova Scotia Legislature
From: Tina Northrup, East Coast Environmental Law
Re: Bill 57: *Environmental Goals and Climate Change Reduction Act*
Date: November 1, 2021

1.0 Introduction

Bill 57, the proposed *Environmental Goals and Climate Change Reduction Act* (*"EGCCRA*"), which the Honourable Minister of Environment and Climate Change tabled in the House of Assembly last week, is a definitive undertaking that will set the tone for the Government of Nova Scotia's actions on climate change for years to come.

East Coast Environmental Law supports Bill 57. We believe that all of its targets, goals, and mandates are valuable, and we are encouraged to see some especially noteworthy language and ideas that set the proposed statute apart from its predecessors—the original *Environmental Goals and Sustainable Prosperity Act* ("*EGSPA*"), the amended *Environmental Goals and Sustainable Prosperity Act* ("*EGSPA 2012*"), and the *Sustainable Development Goals Act* ("*SDGA*"). In particular, we commend the inclusion of "equity" as a guiding principle of the proposed statute and as a factor for consideration in the modernization of Nova Scotia's environmental assessment process; and, we commend the decision to include a government mandate to raise awareness of the importance of the climate change emergency and the elements that contribute to it. These aspects of the bill are promising, and we look forward to seeing them bear fruit.

We recognize the significant work that past and present elected representatives and government staff have done to prepare Bill 57, and we also recognize the contributions made by more than one thousand Nova Scotians who recently took part in consultations on anticipated regulations under the *SDGA*, facilitated by the Clean Foundation of Nova Scotia. The *Environmental Goals and Climate Change Plan for Clean Growth: What We Heard Report* that the Clean Foundation and the Department of Environment and Climate Change issued in October is inspiring to read, and we congratulate all of the government staff and elected representatives who listened to Nova Scotians and worked to propose law that responds to the climate change emergency and commits to decisive action.

The recommended amendments that we put forward in this submission aim to enhance Bill 57 and ensure that *EGCCRA* is as strong and ambitious as Nova Scotians need it to be. We offer our analysis and comments in the same spirit of collaboration that we hope all members of the House of Assembly will demonstrate in enacting *EGCCRA* and working to ensure its mandates are kept and its targets and goals are met.

Sections 2.0 to 5.0 of this submission provide context and argument for our priority recommended amendments. Section 6.0 summarizes our priority recommended amendments. Section 7.0 lists additional comments and recommendations that are not addressed in our substantive discussions, and two appendices provide additional information to support consideration of certain points. We welcome questions on all of these materials.

2.0 Strengthening Greenhouse Gas Emissions Reduction Targets and Ending Fossil Fuel Exploration and Development in Offshore Nova Scotia

2.1 *Set a More Ambitious Greenhouse Gas Emissions Reduction Target for 2030*

When the *SDGA* set greenhouse gas ("GHG") emissions reduction targets of 53% below 2005 levels by 2030 and net zero by 2050, those targets were more ambitious than any other GHG emissions reduction targets that had been legislated in Canada up to that point. However, since the enactment of the *SDGA*, the Government of Prince Edward Island has set a target of reaching net zero by 2040 and declared its intention to make Prince Edward Island the first net-zero province in Canada. Additionally, recent reporting by the Intergovernmental Panel on Climate Change has made it clearer than ever before that the effects of climate change are accelerating and that decisive action now is absolutely imperative. The world's scientists are telling us unequivocally that without radical changes in the next ten years, we will not only blow past the *Paris Agreement* goal of keeping global warming to 1.5 degrees Celsius or less above pre-industrial levels but will grossly exceed the commitment to prevent global warming above 2 degrees.

Bill 57 sets the same GHG emissions reduction targets that the previous government set in the *SDGA*. We recognize that those targets are meaningful and that they demonstrate some ambition; however, we believe that they do not demonstrate sufficient ambition under the circumstances. As members of the 2030 Network which in 2019 established the 2030 Declaration and called for a GHG emissions reduction target of 50% below 1990 levels by 2030, we would like to take this opportunity to emphasize that a more ambitious GHG emissions reduction target for 2030 would better reflect the current reality of the climate change emergency, the urgent need to decarbonize as quickly as possible, and the moral imperative for Canada—supported by its provinces and territories—to contribute its fair share of the GHG emissions reductions that are required globally in order to keep global warming to 1.5 degrees Celsius or less above pre-industrial levels.

The 2030 Declaration target of 50% below 1990 levels by 2030 translates to roughly 58% below 2005 levels by 2030. As Appendix A to this submission, we have attached a backgrounder that the Ecology Action Centre published in March 2019 to explain the reasoning behind the 2030 Declaration target.

> Recommended Amendment 1: Subsection 6(a) of Bill 57 should be amended to state:
>
> > 6 The Government's targets for greenhouse gas emissions reductions are
> >
> > (a) by 2030, to be at least 58% below the levels that were emitted in 2005[.]

2.2 *Clarify that Progress Reporting Must Address the GHG Emissions Reduction Targets*

Section 6 of Bill 57 sets GHG emissions reduction "targets", and the word "targets" appears to distinguish these reductions from the "goals" that the proposed statute contains.

This wording is of concern because the word "targets" is not included in provisions in the bill that refer to progress reporting or the establishment of additional goals in regulations under *EGCCRA*. This suggests that *EGCCRA* could be interpreted to mean that the Minister is not obliged to report on the government's progress toward the achievement of its GHG emissions reduction targets and that the Governor in Council has no express mandate to set additional GHG emissions reduction targets in regulations under the Act. We therefore make the following recommendation:

Recommended Amendment 2: Subsection 21(1) of Bill 57 should be amended to state:

> 21(1) The Minister, in consultation with such members of the Executive Council as the Minister deems appropriate, shall report annually to the House of Assembly on the progress made toward the long-term objective of sustainable prosperity, including progress toward achievement of the greenhouse gas emissions reductions targets and sustainable prosperity goals and initiatives established pursuant to this Act and the regulations.

Our concerns regarding the Governor in Council's regulation-making authority are discussed below in section 2.3.

2.3 *Include a Specific Regulation-Making Power to Set Additional GHG Emissions Reduction Targets and Interim GHG Emissions Reduction Objectives*

Like the *SDGA*, Bill 57 sets just two GHG emissions reduction targets. Setting just two targets for the 29 years between now and 2050 creates too few checkpoints along the path to decarbonization and misses opportunities to set clear expectations that the Government of Nova Scotia, and all Nova Scotians, can work to meet.

Notably, the *Canadian Net-Zero Emissions Accountability Act* includes five "milestone years" for which GHG emissions reduction targets will be set. Under that statute, GHG emissions reduction targets will be set for the years 2030, 2035, 2040, and 2045, all leading up to the ultimate target of net zero emissions by 2050. Additionally, the statute requires an interim GHG emissions reduction objective to be set for the year 2026. Under the statute, the interim GHG emissions reduction "objective" for 2026 will be treated as being somewhat more aspirational than the formal "targets" set for the milestone years.

East Coast Environmental Law recognizes that setting ambitious but realistic GHG emissions reduction targets requires considerable analysis and deliberation. We are therefore not recommending that Bill 57 be amended to include additional GHG emissions reduction targets at this time. However, we believe it is important for *EGCCRA* to signal that the Government of Nova Scotia is willing to consider setting additional GHG emissions reduction targets or interim GHG emissions reduction objectives in the years to come. Notably, *EGSPA 2012* did just that by giving the Governor in Council a specific regulation-making power to establish "interim emission targets for the Province".[1]

We recommend that Bill 57 echo the *Canadian Net-Zero Emissions Accountability Act* and *EGSPA 2012* and include a specific regulation-making power to set additional GHG emissions reduction targets or interim GHG emissions reduction objectives.

Recommended Amendment 3: Subsection 23(1) of Bill 57 should be amended to include an additional regulation-making power, appearing as clause 23(1)(a), as follows:

> 23(1) The Governor in Council may make regulations
>
> (a) setting additional targets for greenhouse gas emissions reductions or setting interim greenhouse gas emissions reductions objectives[.]

[1] See *Environmental Goals and Sustainable Prosperity Act*, SNS 2007, c 7, as amended by 2012, c 42, at clause 4(3)(a).

2.4 *End Fossil Fuel Exploration and Development in Offshore Nova Scotia*

To meet its GHG emissions reduction targets, Nova Scotia must transition off of fossil fuels. Jurisdictions in Canada and around the world—including Québec, British Columbia, New Zealand, and Denmark—are stepping away from oil and gas exploration and development, clearly signalling their decarbonization pathways to net zero.

Nova Scotia is not currently dependent on revenues from the offshore oil and gas sector, and this is not the time to create a dependency. The world's scientists are telling us unequivocally that unexploited fossil fuels must be kept in the ground if we are to prevent the worst possible consequences of climate change. Now is the time for the Government of Nova Scotia to act decisively and commit to ending fossil fuel exploration and development in offshore Nova Scotia.

> Recommended Amendment 4: Section 7 of Bill 57 should be amended to include the following additional goals:
>
> > 7 The Government's goals with respect to climate change mitigation and adaptation and the reduction of greenhouse gas emissions are
> >
> > […]
> >
> > (n) to prohibit all new offshore oil and gas exploration and development by 2022; and
> >
> > (o) to phase out all offshore oil and gas exploration and development by 2025.

3.0 Equipping *EGCCRA* to Prevent Environmental Racism

East Coast Environmental Law welcomes the new focus on equity in Bill 57, and we strongly support the stated goal of modernizing Nova Scotia's environmental assessment process while taking diversity, equity, and inclusion (among other factors) into account.

During a recent debate in the House of Assembly on Bill 22—a private member's bill proposing *An Act to Redress Harm and Environmental Racism*—the Honourable Minister of Environment and Climate Change rose to speak to the bill and made several comments suggesting that Bill 57's goal of modernizing Nova Scotia's environmental assessment process will help to prevent further instances of environmental racism in the province. To contextualize our discussion in this section, we wish to quote some of the Honourable Minister's comments at length:

> It is the intention of this government that we will not leave anyone behind. Madam Speaker, I acknowledge that past practices resulted in environmental racism in this province. That was wrong. We know we need to build trust. We know we need to build relationships.
>
> […]
>
> As the regulator, the Department of Environment and Climate Change must work to ensure every Nova Scotian has equitable access to a healthy, safe, and sustainable environment, as well as equal protection from environmental harm. A thriving today and a just future. We must treat all Nova Scotians fairly and in an equitable manner so that Nova Scotia does not repeat the mistakes of our past.
>
> […]

> We do need to hear from communities that feel they don't have a strong enough voice. That needs to improve. We need to do better and work with these communities to change this. We want to make sure meaningful engagement takes place so that our staff can use the information for decision-making, and so that proponents can do their work to gain the social licence for their projects.
>
> Our job at the Department of Environment and Climate Change is to work with businesses and industry to make sure they've had meaningful dialogue with those who will be affected. As I indicated, Madam Speaker, it is the intention of the government to introduce new legislation shortly that I believe will guide Nova Scotia forward to a healthier, cleaner, greener, and more sustainable future for all Nova Scotians.
>
> Madam Speaker, I'm proud to say that this legislation will be informed by conversations we had with Nova Scotians. They told us they want the well-being of people and the planet to come first. They want to break down systemic racism and discrimination. Nova Scotians wish to reduce income inequality and ensure that no one is left behind. They also want swift, tangible action.
>
> […]
>
> I believe we have listened. […]
>
> […]
>
> Going forward, I will also examine the department's legislation, regulations, and decision-making processes to ensure equitable treatment of all communities and ensure consultation opportunities are available to all Nova Scotians. We are taking action to create a cleaner, healthier, and more just environment that will benefit all Nova Scotians and won't leave anyone behind. We know we need to make space for community leaders and follow their input to guide us all forward. Working together, Madam Speaker, I believe we can ensure project decisions that affect communities are fair and equitable.[2]

Our understanding is that the new focus on equity in Bill 57 and the goal of modernizing Nova Scotia's environmental assessment process by taking diversity, equity, and inclusion into account are reflections of the acknowledged need to end systemic racism in Nova Scotia and prevent further instances of environmental racism in the province. With this in mind, our comments and recommended amendments in this section aim to strengthen *EGCCRA*'s plans to address environmental racism in a meaningful way.

3.1 *Include Etuaptmumk and the United Nations Declaration on the Rights of Indigenous Peoples as Factors for Consideration in the Modernization of Nova Scotia's Environmental Assessment Process*

We are encouraged to see Elder Albert Marshall's concept of etuaptmumk ("two-eyed seeing") recognized in Bill 57, and we are also encouraged to see the Mi'kmaw principle of netukulimk included as one of the factors to be considered in the modernization of Nova Scotia's environmental assessment process. We believe that Mi'kmaw epistemologies (ways of knowing) and Mi'kmaw principles governing engagement with the natural world are crucial to the progressive reform of environmental decision-making in Nova Scotia.

[2] See Nova Scotia House of Assembly, *Hansard* (First Session: 20 October 2021) at pages 430-33, online: <https://nslegislature.ca/legislative-business/hansard-debates/assembly-64-session-1/house_21oct20#HPage425>.

In our view, etuaptmumk should be included as a factor for consideration in the modernization of Nova Scotia's environmental assessment process, as it bears directly on the inclusion of materials such as Mi'kmaw Ecological Knowledge studies and other avenues through which traditional ecological knowledge may be shared. The two-eyed seeing approach is, explicitly, an approach that seeks to see through the "eyes" of both Western science and Indigenous knowledge, and we believe that section 12 of Bill 57 would be strengthened considerably by acknowledging the significance of etuaptmumk to environmental assessments.

Additionally, we believe that meaningful efforts to ensure equity in environmental decision-making in Nova Scotia must be guided by the *United Nations Declaration on the Rights of Indigenous Peoples* ("*UNDRIP*"), and we therefore recommended that *UNDRIP* also be included as a factor for consideration under section 12.

> Recommended Amendment 5: Section 12 of Bill 57 should be amended to include etuaptmumk and *UNDRIP* as factors for consideration in the modernization of Nova Scotia's environmental assessment process, as follows:
>
> > 12 The Government's goal with respect to environmental assessments is to modernize the environmental assessment process by 2024 taking into consideration
> >
> > (a) cumulative impacts;
> >
> > (b) diversity, equity and inclusion;
> >
> > (c) independent review;
> >
> > (d) Netukulimk;
> >
> > (e) Etuaptmumk;
> >
> > (f) the *United Nations Declaration on the Rights of Indigenous Peoples*; and
> >
> > (g) climate change.

3.2 *Review and Update Environmental Decision-Making Outside the Environmental Assessment Process*

As East Coast Environmental Law noted in submissions that we made in consultations on the anticipated *SDGA* regulations, there are significant environmental decision-making processes in Nova Scotia that affect Mi'kmaw, African Nova Scotian, and other Indigenous and racialized communities and that are not considered through the provincial environmental assessment regime. For example, several of Nova Scotia's most notorious examples of environmental racism involved the creation and operation of landfills in African Nova Scotian communities. Proposed landfills in Nova Scotia do not undergo environmental assessments; instead, they are authorized through processes developed under the *Activities Designation Regulations* and the *Approval and Notification Procedure Regulations* under the *Environment Act.*

We therefore wish to emphasize strongly that the admirable visions of equitable environmental decision-making in Nova Scotia and equitable access to a healthy, safe, and sustainable environment will not be realized unless all relevant environmental decision-making processes in Nova Scotia are reformed progressively under the lens of diversity, equity, and inclusion. We therefore recommend that section 12

of Bill 57 be expanded to include the review and update of environmental-decision making processes that are outside the environmental assessment regime.

In our view, the significance of etuaptmumk, netukulimk, and *UNDRIP* should also be reiterated with respect to environmental decision-making outside the environmental assessment process.

> Recommended Amendment 6: Section 12 of Bill 57 should be split into two subsections, the first of which contains the amendments we recommended above, and the second of which addresses environmental decision-making outside the environmental assessment process, as follows:
>
> > 12(2) The Government's goal with respect to environmental decision-making outside the environmental assessment process is to review and update environmental approval and notification procedures by 2024 taking into consideration
> >
> > (a) diversity, equity and inclusion;
> >
> > (b) Netukulimk;
> >
> > (c) Etuaptmumk; and
> >
> > (d) the *United Nations Declaration on the Rights of Indigenous Peoples*.

Including this additional goal would not only be in keeping with the government's stated objectives but would also affirm in *EGCCRA* the commitment that the Honourable Minister of Environment and Climate Change made in the House of Assembly when he spoke on Bill 22 and said that, going forward, he would examine his department's "legislation, regulations, and decision-making processes to ensure equitable treatment of all communities" in Nova Scotia.

4.0 Setting Sustainable Aquaculture Goals for Nova Scotia

4.1 *Transition Away from High-Impact Aquaculture in Nova Scotia*

We are encouraged to see that Bill 57 includes a provision to support low-impact sustainable aquaculture; however, the intent of the provision is unclear to us. We note that the *Environmental Goals and Climate Change Plan for Clean Growth: What We Heard Report* found that there was a strong show of support for a government phase-out of open-net pen finfish operations by 2025.[3] Other jurisdictions are moving away from a marine-based finfish industry and are transitioning to alternative technologies such as closed containment, land-based systems.

In addition to clause 14(a), which supports low-impact sustainable aquaculture, we recommend that Bill 57 commit Nova Scotia to transitioning away from aquaculture operations that are not low-impact, including open-net pen finfish operations, by 2025.

> Recommended Amendment 7: Section 14 of Bill 57 should include an additional goal, appearing as clause 14(b), as follows:
>
> > 14 The Government's goals with respect to aquaculture and food are

[3] See Clean Foundation of Nova Scotia and Nova Scotia Department of Environment and Climate Change, *Environmental Goals and Climate Change Plan for Clean Growth: What We Heard Report* (October 2021) at page 43.

[…]

(b) to transition away from aquaculture operations that are not low-impact, including open-net pen finfish operations, by 2025[.]

5.0 Enhancing Government Accountability and Transparency under *EGCCRA*

As proposed, Bill 57 includes a number of provisions that address government accountability and transparency. Section 21 requires the Minister to deliver annual reports on the government's progress toward the achievement of the sustainable prosperity goals and initiatives established under the Act. Section 22 requires the Minister to request that the Round Table carry out a public review of the Act and its regulations no later than five years after the Act comes into force and at any other time the Minister considers appropriate. In our view, the following amendments to the bill would greatly strengthen government accountability and transparency under *EGCCRA*.

5.1 *Require Specific Contents in the Minister's Annual Progress Reports, Particularly with Respect to Nova Scotia's GHG Emissions Reduction Targets*

As proposed, Bill 57 says very little about the required contents of the Minister's annual progress reports. Subsection 21(1) of the proposed statute currently states:

> 21(1) The Minister, in consultation with such members of the Executive Council as the Minister deems appropriate, shall report annually to the House of Assembly on the progress made toward the long-term objective of sustainable prosperity, including progress toward achievement of sustainable prosperity goals and initiatives established pursuant to this Act.

As we noted above, the GHG emissions reduction targets set out in section 6 of the proposed statute are characterized expressly as "targets", not "goals", which means that a strict reading of subsection 21(1) raises questions about the Minister's obligations to report annually on the government's progress toward the achievement of those targets in addition to the "sustainable prosperity goals and initiatives" established under the Act.

Even assuming that subsection 21(1) requires the Minister to report annually on the government's progress toward the achievement of Nova Scotia's GHG emissions reduction targets, the proposed statute provides no guidance concerning the information that the Minister should include to ensure that Nova Scotians can understand and evaluate the government's progress.

For comparison, the *Canadian Net-Zero Emissions Accountability Act*—the federal statute under which Canada's national GHG emissions reduction targets for 2030, 2035, 2040, and 2045 will be set—requires two forms of periodic reporting by the Government of Canada: progress reporting and assessment reporting. Under the statute, progress reports are due two years in advance of each milestone year for which a GHG emissions reduction target has been set, and assessment reports are due shortly after each target deadline. Progress reports evaluate whether the federal government is on track to meet its targets, and assessment reports identify the government's success or failure in meeting its targets. The statute sets specific content requirements for progress reports and assessment reports, and those content requirements are detailed enough to ensure that Canadians can understand and evaluate the federal government's progress toward the achievement of Canada's targets.

The annual reports required by subsection 21(1) of Bill 57 could easily incorporate key elements of progress reporting and assessment reporting that are modelled in the *Canadian Net-Zero Emissions Accountability Act*.

Bill 57 could detail specific content requirements for the Minister's annual progress reports; alternatively, the proposed statute could signal an express intent to create regulations that set mandatory content requirements for the reports.

Recognizing that the government may not be prepared to set specific content requirements for the Minister's annual progress reports within *EGCCRA* itself at this time, we recommend that the government take the latter approach and signal an express intent to establish mandatory content requirements in regulations under the Act.

> Recommended Amendment 8: Section 21 of Bill 57 should be amended to include an additional subsection, appearing as subsection 21(2), as follows:
>
> 21(2) The annual report referred to in subsection (1) shall comply with regulations established pursuant to clause 23(1)(f) of this Act.

Appendix B of this submission recommends specific content requirements that could be established in *EGCCRA* itself or in regulations under the Act. The language we propose adapts the progress reporting and assessment reporting requirements established in the *Canadian Net-Zero Emissions Accountability Act*, tailoring them for the Nova Scotian context.

5.2 *Require the Minister to Seek Advice from the Round Table when Preparing Annual Reports*

Subsection 21(2) of Bill 57 currently states:

> 21(2) In preparing the annual report referred to in subsection (1), the Minister may seek advice from the Round Table.

In this proposed provision, the word "may" creates a discretionary power and does not require the Minister to seek the Round Table's advice when preparing the annual report. This language replicates an analogous provision in the *SDGA*; however, it differs noticeably from the analogous provision in *EGSPA 2012*, which uses the imperative "shall" instead of the discretionary "may". Subsection 6(4) of *EGSPA 2012* states:

> 6(4) In preparing the annual report referred to in subsection (1), the Minister shall seek advice from the Round Table.

The Round Table's purpose as an advisory body to the Minister would be more appropriately acknowledged and better served if *EGCCRA* required the Minister to seek advice from the Round Table when preparing annual reports.

> Recommended Amendment 9: Subsection 21(2) of Bill 57 should be amended (taking into account the proposed inclusion of an additional provision appearing as subsection 21(2) and the corresponding need to re-number), as follows:
>
> > 21(3) In preparing the annual report referred to in subsection (1), the Minister shall seek advice from the Round Table.

5.3 *Require Reviews of the Proposed Act Every Five Years, Set a Clear Timeline for Such Reviews, and Set a Clear Expectation that Such Reviews May Lead to Amendments to the Act or Improvements in Its Implementation*

Section 22 of Bill 57 currently states:

> 22 The Minister shall request the Round Table to carry out a public review of this Act and the regulations
>
> (a) no later than five years after this Act comes into force; and
>
> (b) at any other time the Minister considers appropriate.

This language replicates an analogous provision in the *SDGA*; however, the provision differs noticeably from the analogous provision in *EGSPA 2012*, which states:

> 6(2) The Minister shall request the Round Table to carry out a comprehensive public review of this Act and the regulations every five years after this Act comes into force, and request the Round Table to submit to the Minister, within nine months of initiating the review, a report with recommendations for amendments and improvements in the implementation of this Act.

Unlike Bill 57, *EGSPA 2012* required the Minister to initiate a public review of the statute every five years after it came into force. This not only required the statute to be reviewed regularly but also ensured that long-term goals would receive sustained attention. *EGSPA 2012* also set a clear timeline for the Round Table's periodic reviews: it required the Minister to request that the Round Table submit a report with recommendations for amendments and improvements in the implementation of the statute no more than nine months after the initiation of the review. Finally, *EGSPA 2012*, like the original *EGSPA* before it, set a clear expectation that the periodic reviews by the Round Table might lead to responsive amendments to the statute or improvements in its implementation.

Several of the targets and goals contained in Bill 57 extend well beyond the initial five-year period that will follow the proposed statute coming into force. Requiring the Minister to request that the Round Table carry out a public review of *EGCCRA* and its regulations every five years after the Act comes into force, and setting a clear timeline for such reviews, will strengthen government accountability and transparency under the Act by ensuring that its long-term goals receive sustained attention and that public reviews of the Act are carried out with regularity and efficiency.

Additionally, a clear expectation that periodic reviews may lead to amendments to *EGCCRA* or improvements in its implementation will help to "create conditions necessary for making progress toward sustainable prosperity" and enable "continuous improvement in measures of social, environmental and economic indicators of prosperity"[4] by cultivating a political culture which recognizes that *EGCCRA*'s goals and targets must evolve responsively to meet emerging or increasingly pressing needs in the years to come.

> Recommended Amendment 10: Section 22 of Bill 57 should be amended to state:
>
> > 22 The Minister shall request the Round Table to carry out a public review of this Act and the regulations

[4] See Bill 57 at clauses 5(1)(e) and 5(1)(f).

(a) every five years after this Act comes into force; and

(b) at any other time the Minister considers appropriate

and the Minister shall in the House of Assembly table a report containing recommendations for amendments to the Act and improvements in its implementation within one year following a request for review or, where the House is not then sitting, file that report with the Clerk of the House.

5.4 *Require Public Review of Regulations that the Governor in Council Proposes to Establish under EGCCRA*

Section 26 of Nova Scotia's *Environment Act* requires public review of proposed new regulations and substantive amendments to regulations under that statute.

Government accountability and transparency would be enhanced by the inclusion of a similar provision in Bill 57. Additionally, requiring public reviews of proposed new regulations and substantive amendments to regulations under *EGCCRA* may strengthen Nova Scotians' sense of agency and deepen their investment in the Act and, in doing so, further the government's stated objectives of raising awareness about "the importance of sustainable prosperity and the climate change emergency and the elements that contribute to them", creating "conditions necessary for making progress toward sustainable prosperity", and working toward "continuous improvement in measures of social, environmental and economic indicators of prosperity".[5]

Recommended Amendment 11: Section 23 of Bill 57 should be amended to include a subsection, appearing as subsection 23(3) and modelled on analogous language in the *Environment Act*, that requires public review of proposed new regulations and substantive amendments to regulations under *EGCCRA*, as follows:

23(3) Any new regulations and any substantive amendment to regulations established pursuant to this Act become law only after the regulations or amendments, as the case may be, have been subjected to such public review as the Minister deems appropriate.

6.0 Summary of Priority Recommended Amendments

The following table summarizes the recommended amendments to Bill 57 that we have discussed above. For reference, the table identifies the pages in this submission wherein individual recommendations are discussed.

Table 1: Priority Recommended Amendments to Bill 57

Section	Recommended Amendment(s)	Discussion
6	The Government's targets for greenhouse gas emissions reductions are (a) by 2030, to be at least ~~53%~~ 58% below the levels that were emitted in 2005; and […]	page 2, Appendix A

[5] See Bill 57 at clauses 5(1)(b), 5(1)(e), and 5(1)(f).

Section	Recommended Amendment(s)	Discussion
7	7 The Government's goals with respect to climate change mitigation and adaptation and the reduction of greenhouse gas emissions are […] (l) to have 80% of electricity in the Province supplied by renewable energy by 2030; ~~and~~ (m) to phase out coal-fired electricity generation in the Province by the year 2030~~.~~; (n) to prohibit all new offshore oil and gas exploration and development by 2022; and (o) to phase out all offshore oil and gas exploration and development by 2025.	page 4
12	12(1) The Government's goal with respect to environmental assessments is to modernize the environmental assessment process by 2024 taking into consideration (a) cumulative impacts; (b) diversity, equity and inclusion; (c) independent review; (d) Netukulimk; ~~and~~ (e) Etuaptmumk; (f) the *United Nations Declaration on the Rights of Indigenous Peoples*; and ~~(e)~~(g) climate change.	pages 4-7
12(2) NEW	12(2) The Government's goal with respect to environmental decision-making outside the environmental assessment process is to review and update environmental approval and notification procedures by 2024 taking into consideration (a) diversity, equity and inclusion; (b) Netukulimk; (c) Etuaptmumk; and (d) the *United Nations Declaration on the Rights of Indigenous Peoples*.	pages 4-7
14	14 The Government's goals with respect to aquaculture and food are (a) to support low-impact sustainable aquaculture through a licensing process that weighs environmental considerations and includes provincial regulation for potential environmental impacts, animal welfare and fish health; ~~and~~ (b) to transition away from aquaculture operations that are not low-impact, including open-net pen finfish operations, by 2025; and […]	pages 7-8

Section	Recommended Amendment(s)	Discussion
21	21(1) The Minister, in consultation with such members of the Executive Council as the Minister deems appropriate, shall report annually to the House of Assembly on the progress made toward the long-term objective of sustainable prosperity, including progress toward achievement of the greenhouse gas emissions reductions targets and sustainable prosperity goals and initiatives established pursuant to this Act and the regulations. 21(2) The annual report referred to in subsection (1) shall comply with regulations established pursuant to clause 23(1)(f) of this Act. 21~~(2)~~(3) In preparing the annual report referred to in subsection (1), the Minister ~~may~~ shall seek advice from the Round Table. […]	pages 2-3. 8-9
22	22 The Minister shall request the Round Table to carry out a public review of this Act and the regulations (a) ~~no later than~~ every five years after this Act comes into force; and (b) at any other time the Minister considers appropriate and the Minister shall in the House of Assembly table a report containing recommendations for amendments to the Act and improvements in its implementation within one year following a request for review or, where the House is not then sitting, file that report with the Clerk of the House.	pages 10-11
23(1)	23(1) The Governor in Council may make regulations (a) setting additional targets for greenhouse gas emissions reductions or setting interim greenhouse gas emissions reductions objectives; […]	page 3, Appendix B
23(3) NEW	23(3) Any new regulations and any substantive amendment to regulations established pursuant to this Act become law only after the regulations or amendments, as the case may be, have been subjected to such public review as the Minister deems appropriate.	page 11

7.0 Additional Comments and Recommended Amendments

Finally, we offer the following comments and recommendations on aspects of Bill 57 that are not addressed in our discussions above. Several of these comments and recommended amendments demonstrate our concerns about overly-extended timelines for the achievement of goals set out in the proposed statute; other comments and recommend amendments make technical points concerning the consistency and meaning of words and phrases used throughout the bill.

Table 2: Additional Comments on and Recommended Amendments to Bill 57

Bill 57 Provisions Proposed	Comments and Recommended Amendments
7(e)	The goal of adopting the 2020 National Energy Code for Buildings within 18 months of it being published by the Government of Canada appears to us to set an overly-extended timeline for adoption.
8(d)	The phrase "clean inclusive growth" in this section appears to retain the *SDGA*'s focus on "inclusivity" and does not reflect Bill 57's more specific focus on "equity" as a guiding principle: we therefore recommend that this clause be amended to refer to "equitable growth".
10(d)	The goal of implementing by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in *An Independent Review of Forest Practices in Nova Scotia* appears to us to set an overly-extended timeline for adoption: we recommend that the deadline be amended to 2022.
11(a) and 11(b)	The goals of developing provincial water quality objectives and addressing and mitigating barriers that Nova Scotians face to the testing and treatment of rural wells by 2026 appear to us to set overly-extended timelines for completion. Given work that has already been done, resources that already exist, and the clear and pressing need for government action, we recommend that the deadline be amended to 2022 or 2023 at the very latest.
13	This goal with respect to sustainable procurement should include "equity" as well as diversity and inclusion.
14(b)	The goal of achieving 20% consumption of local food by 2030 simply reiterates the *EGSPA 2012* goal, and it therefore lacks currency and ambition, in our view.
15(b)	The goal of reducing solid waste disposal rates to no more than 300 kilograms per person per year by 2030 simply reiterates the *EGSPA 2012* goal, and it therefore lacks currency and ambition, in our view. We note that the *Environmental Goals and Climate Change Plan for Clean Growth: What We Heard Report* states that contributors to the public consultation on anticipated regulations under the *SDGA* showed "strong support for reducing the provincial solid waste disposal rate by 50 per cent below 2020 levels by 2030 and achieving zero plastic waste by 2030" (see pages 4, 31).
23(1)(a)	This clause speaks of "focus areas" established pursuant to the Act, but, unlike the *SDGA*, Bill 57 does not identify its focus areas expressly. This phrase appears to be a holdover from the *SDGA*, and its relevance to Bill 57 is not entirely clear.

Appendix A: 2030 Declaration Backgrounder by the Ecology Action Centre

2030 Declaration – GHG Target Background

March 2019

The **2030 Declaration** sets a vision for strong climate action, and working toward a low-carbon economy in a way that is based in justice and equity for workers and communities in Nova Scotia.

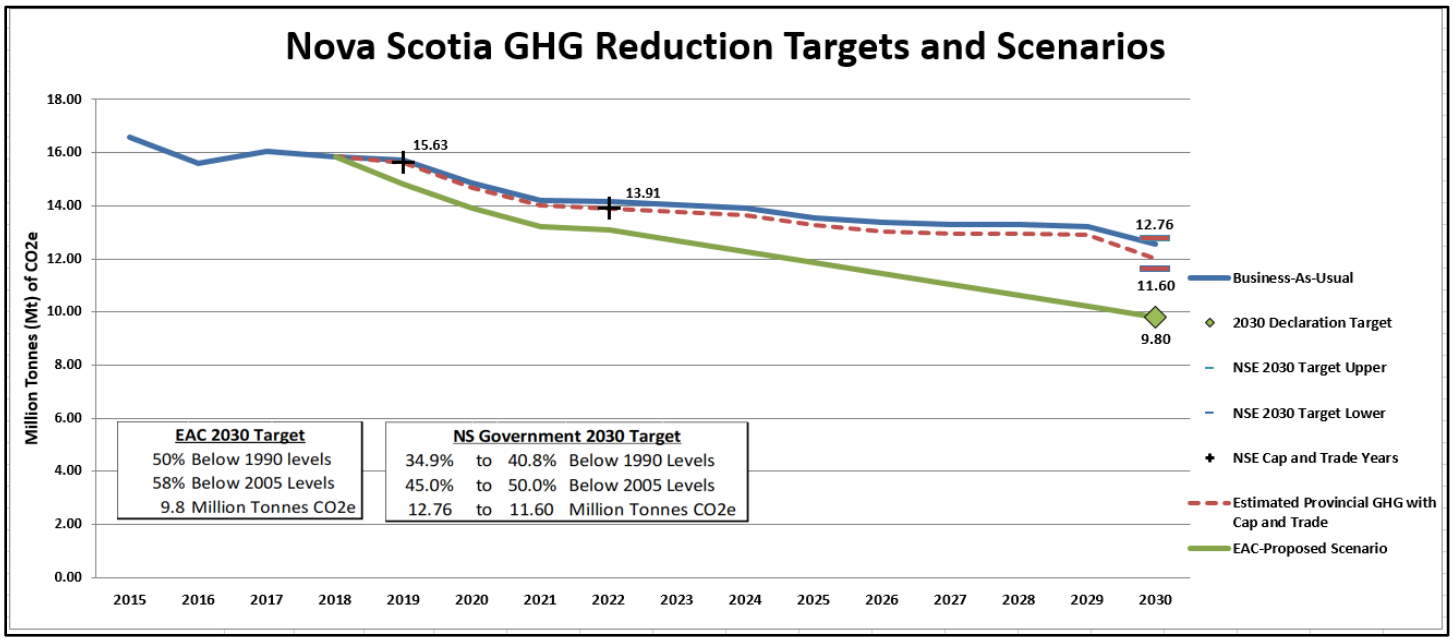
As part of this vision, the 2030 Declaration puts forward a greenhouse gas reduction target of **50% below 1990 levels by 2030.** The below is a brief on why this target was chosen.

Nova Scotia's Existing Greenhouse Gas Reduction Targets and Goals

The 2030 Declaration target is 50% below 1990 levels by 2030, which equal to about 58% below 2005 levels, or about 37% below 2017 levels.

Through the Environmental Goals and Sustainable Prosperity Act, Nova Scotia has a greenhouse gas reduction target of 10% below 1990 by 2020. This goal was reached years early, in 2014. [i]

Nova Scotia currently has no legislated greenhouse gas reduction targets beyond 2020, and has regulated business-as-usual targets for 2030 as part of the Cap and Trade system that are not in line with climate science. Nova Scotia's current target range for 2030 is between 45% and 50% below 2005 levels, which is equal to between 35% and 41% below 1990 levels.



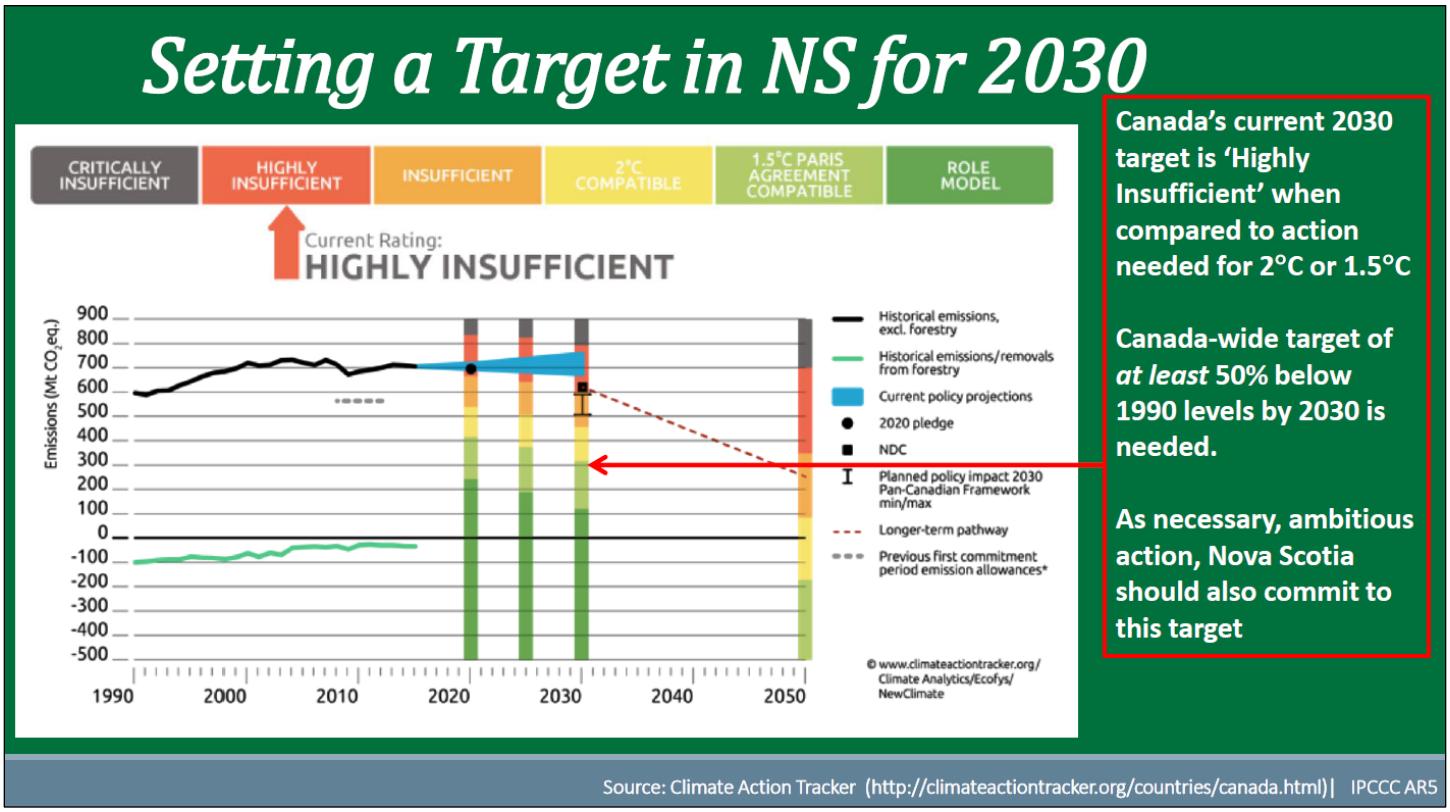
2030 Declaration – GHG Target Background

How Was 50% Below 1990 Levels by 2030 Chosen?

The greenhouse gas reduction target of 50% below 1990 Levels by 2030 was chosen for two key reasons.

First, this target is an estimate of what would be fair for Canada's contribution to greenhouse gas emissions reductions in order to meet the *Paris Agreement targets of 2.0℃ and 1.5℃ of global warming*. Canada's current Nationally Determined Contribution to the UN is 30% below 2005 levels by 2030, and is categorized as "Highlighly Insufficient" and consistent with globally catastrophic levels of warming of between 3.0°C and 4.0°C [ii].
Analysis from Climate Action Tracker[iii] (an independent scientific analysis produced by three research organizations tracking climate action since 2009) shows a value of about 50% below 1990 levels by 2030 to be consistent with Canada's fair contributions to the Paris Agreement targets of 2.0°C and 1.5°C of global warming. See the graphic below and supporting links for more details.

Second, this target lines up with the Green Economy Network's analysis[iv] for creating 30,700 jobs in Nova Scotia in the renewable energy, energy efficiency and sustainable transportation sectors, as part of their 1 Million Climate Jobs Plan[v].



2030 Declaration – GHG Target Background

How Will the 2030 Declaration Target be Implemented?

We advocate for this target to be implemented through the upcoming renewal of the Environmental Goals and Sustainable Prosperity Act – where Nova Scotia's current 2020 targets are legislated.

How Does the 2030 Declaration Target Compare to Other Jurisdictions?

British Columbia, Ontario, Quebec, New Brunswick and Prince Edward Island all have 2030 emission reduction targets of between 25% and 40% below 1990 levels, and other provinces and territories either have no legislated targets, or their targets are in process.[vi]

The 2030 Declaration target – 50% below 1990 levels by 2030 - would be the most ambitious climate mitigation target in Canada, and would place Nova Scotia back in a leadership position when it comes to action on climate change.

Other countries have targets that far exceed the 2030 Declaration Target, including:

- United Kingdom: 57% below 1990 by 2030[vii]
- Germany: 55% below 1990 levels by 2030[viii]
- Norway: Carbon Neutral by 2030[ix]

What's the Plan? How will Nova Scotia work toward meeting the Declaration Target?

The 2030 Declaration speaks to the need to set strong targets, and work together to create a plan that is based in justice, equity and benefit for communities and workers. It is intentional that the Declaration does not prescribe one path to getting to the 2030 target, but lays out a vision and principles for how we work together to create a path that works best for Nova Scotia.

We know that the technology for a just transition to a low-carbon economy is available. We know that there are vast renewable resources in Nova Scotia. We have fantastic experience in Nova Scotia to build on, when it comes to reducing emissions, creating jobs, and ensuring prosperity for our communities. It's important that we commit to broad, public consultations on climate action, and develop solutions that center justice and equity, as is laid out in the 2030 Declaration.

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[i] Nova Scotia EGSPA Goals: https://novascotia.ca/nse/egspa/
[ii] Climate Action Tracker – Canada: https://climateactiontracker.org/countries/canada/
[iii] Climate Action Tracker – About: https://climateactiontracker.org/about/
[iv] Green Economy Network – About: http://greeneconomynet.ca/about-us/
[v] GEN – Nova Scotia Analysis: http://greeneconomynet.ca/wp-content/uploads/sites/43/2017/05/Nova-Scotia-long-EN.pdf
[vi] Auditors General Report —March 2018 - http://www.oag-bvg.gc.ca/internet/English/parl_otp_201803_e_42883.html
[vii] UK Target: https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/
[viii] Germany Target: https://www.cleanenergywire.org/factsheets/germanys-greenhouse-gas-emissions-and-climate-targets
[ix] Norway Target: https://www.stortinget.no/no/Saker-og-publikasjoner/Publikasjoner/Innstillinger/Stortinget/2015-2016/inns-201516-407/4/

Appendix B:

Mandatory Content Requirements for the Minister's Annual Reports

As regards the Government of Nova Scotia's progress toward the achievement of its GHG emissions reduction targets, we recommend that progress reporting requirements established in or under *EGCCRA* include the following, at minimum:

> (a) a summary of the Province's most recent greenhouse gas emissions inventory;
>
> (b) an update on the progress that has been made toward the achievement of the Government's targets for greenhouse gas emissions reductions;
>
> (c) descriptions of the key greenhouse gas emissions reduction measures the Government intends to take to achieve its targets for greenhouse gas emissions reductions, including projections of the annual greenhouse gas emissions reductions that those measures will cause;
>
> (d) if the projections indicate that the Government's next target for greenhouse gas emissions reductions will not be met, descriptions of any additional measures that could be taken to increase the probability of achieving that target;
>
> (e) if the report follows a calendar year for which a target for greenhouse gas emissions reductions was set, a statement on whether the Government achieved its greenhouse gas emissions reduction target;
>
> (f) if the report follows a calendar year for which a target for greenhouse gas emissions was set and states that the Government failed to achieve its greenhouse gas emissions reduction target,
>
> > (i) the reasons why the Government failed to meet the target; and
> >
> > (ii) a description of actions the Government is taking or will take to address its failure to achieve the target;
>
> and
>
> (g) any other information that the Minister considers appropriate.

These proposed provisions adapt the progress reporting and assessment reporting requirements that were established in the *Canadian Net-Zero Emissions Accountability Act*, tailoring them for the Nova Scotian context. For reference, the progress reporting and assessing reporting requirements that the Government of Canada established in the *Canadian Net-Zero Emissions Accountability Act* are copied below.

> **Reports**
>
> **Progress report**
>
> 14 (1) In consultation with the ministers referred to in section 12, the Minister must prepare at least one progress report relating to each milestone year and to 2050 no later than two years before the beginning of the relevant year.

First progress reports

(1.1) In consultation with the ministers referred to in section 12, the Minister must prepare a progress report in respect of the first milestone year by no later than the end of 2023, another by no later than the end of 2025 and another by no later than the end of 2027.

2025 progress report

(1.2) The 2025 progress report must contain an assessment of the 2030 greenhouse gas emissions target, based on the most recent developments in science, technology and greenhouse gas emissions management, and the Minister must consider whether the target should be changed, based on those developments.

Content of report

(2) A progress report must contain

> (a) an update on the progress that has been made towards achieving the greenhouse gas emissions target;
>
> (a.1) Canada's most recent published greenhouse gas emissions projections for the next milestone year;
>
> (a.2) a summary of Canada's most recent official greenhouse gas emissions inventory and the information, relevant to the report, that Canada submitted under its international commitments with respect to climate change;
>
> (b) an update on the implementation of the federal measures, sectoral strategies and federal government operations strategies described in the relevant emissions reduction plan and, if available, updated projections of annual greenhouse gas emission reductions resulting from those combined measures and strategies;
>
> (b.1) an update on the implementation of the key cooperative measures or agreements with provinces or other governments in Canada described in the relevant emissions reduction plan;
>
> (b.2) if the projections indicate that the plan's greenhouse gas emissions target will not be met, details of any additional measures that could be taken to increase the probability of achieving that target; and
>
> (c) any other information that the Minister considers appropriate.

Interim progress

(3) Any progress report relating to 2030 must include an update on the progress that has been made towards achieving the interim greenhouse gas emissions objective for 2026.

Assessment report

15 (1) In consultation with the ministers referred to in section 12, the Minister must prepare an assessment report in relation to a milestone year or to 2050 no later than 30 days after the day on

which Canada submits its official greenhouse gas emissions inventory report in accordance with the Convention in relation to the relevant milestone year or to 2050, as the case may be.

Contents of report

(2) An assessment report must contain

> (a) a summary of Canada's most recent official greenhouse gas emissions inventory and information, relevant to the report, that Canada submitted under its international commitments with respect to climate change;
>
> (b) a statement on whether Canada has achieved its national greenhouse gas emissions target for that year;
>
> (c) an assessment of how the federal measures, sectoral strategies, and federal government operations strategies described in the relevant emissions reduction plan contributed to Canada's efforts to achieve the national greenhouse gas emissions target for that year;
>
> (c.1) an assessment of how the key cooperative measures or agreements with provinces or other governments in Canada described in the relevant emissions reduction plan contributed to Canada's efforts to achieve the national greenhouse gas emissions target for that year;
>
> (d) any information relating to adjustments that could be made to subsequent emissions reduction plans in order to increase the probability of meeting subsequent national greenhouse gas emissions targets; and
>
> (e) any other information that the Minister considers appropriate.

Failure to achieve target

16 If the Minister concludes that Canada has not achieved its national greenhouse gas emissions target for a milestone year or for 2050, as the case may be, the Minister must, after consulting with the ministers referred to in section 12, include the following in the assessment report:

> (a) the reasons why Canada failed to meet the target;
>
> (b) a description of actions the Government of Canada is taking or will take to address the failure to achieve the target; and
>
> (c) any other information that the Minister considers appropriate.

From: [redacted]
To: Office of the Legislative Counsel
Cc: Minister, Env; Minister, Natural Resources and Renewables
Subject: Submission to Law Amendments Committee re Bill 57 -- Dale Smith
Date: November 1, 2021 8:58:12 AM
Attachments: Law Amendments EGCCRA f.docx

Members of the Law Amendments Committee,

Attached, please find my submission in regard to Bill 57.

In the submission a number of amendments are recommended, specifically in reference to Section 10 which addresses goals regarding the protection of land, with consideration to: (1) providing greater clarity and consistency with the spirit and intent of the Lahey Report; (2) maintaining compatibility with the recently-amended Crown Lands Act; and (3) promoting a collaborative and coordinated land use planning approach for Nova Scotia's Crown lands and protected areas.

Given the target date of December 31, 2023 for completion of the proposed collaborative protected areas strategy and finalization of the triad zoning model for the identification of protected areas and the allocation of Crown lands, it is essential that forestry harvesting decisions over the interim period (i.e. until that target date is reached and/or said planning initiatives have been completed) be coordinated between the Departments of Environment and Climate Change and of Natural Resources and Renewables. **In the absence of effective coordination, as recommended, the only other credible approach is to place a moratorium on forestry harvesting on Crown land over the period when plans are being prepared.**

Thank you for your consideration.

Dale Smith
[redacted]

Bill 57 – Environmental Goals and Climate Change Reduction Act

Submission to Law Amendments Committee

Dale Smith, Halifax Regional Municipality – October 31, 2021

Introduction and Synopsis

Bill 57, the Environmental Goals and Climate Change Reduction Act (EGCCRA) is the most significant environmental legislation since its predecessor, the Environmental Goals and Sustainable Prosperity Act (EGSPA), was and passed and received Royal Assent in the Spring, 2007.

As with EGSPA, Bill 57 proposes a wide variety of goals to foster environmental sustainability and economic well-being in order to achieve sustainable prosperity as the long-term objective of Government.

This submission focusses directly and specifically on Section 10, which sets out Government's goals with respect to the protection of land, as highlighted immediately below.

> 10 The Government's goals with respect to the protection of land are
>
> (a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;
>
> (b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;
>
> (c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" prepared by William Lahey in 2018, through the triad model of forest management that prioritizes the sustainability of ecosystems and biodiversity in the Province; and
>
> (d) to identify by 2023 the percentage allocation of Crown land dedicated to each pillar of the triad odel of forest management referred to in clause (c).

Based on the clause-by-clause review of Section 10 in the body of this submission, the following amendments to Clauses 10(c) and 10(d), and the addition of Clause 10(e), are recommended.
(*A Track Changes version is shown in the concluding section of this submission*)

> (c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" that prioritizes the sustainability of ecosystems and biodiversity in the Province;
>
> (d) to support the goal in clause (c) with a comprehensive land use planning approach for the allocation of Crown land dedicated to each pillar of the triad model of ecological forestry by December 31, 2023;
>
> (e) to ensure coordination of protected area, Crown land use and forestry management planning by requiring, over the interim period ending December 31, 2023, forestry harvesting plans to be jointly approved by the responsible Ministers.

Clause 10(a) – The 20% Protection Goal

The goal of conserving at least 20% of Nova Scotia's land and water mass by 2030 is laudable, especially in light of the high percentage (approximately 60%) of the province that is in private ownership.

It is encouraging that this goal references consistency "with national reporting criteria", essentially as a control mechanism to limit any possible attempts to 'water down' criteria at the provincial level and thereby to enable spurious claims that certain areas or designations contribute to the 20% target when, in fact, they would not be fully protected. Similar forces of course are likely to be at play at the national level; however, with multiple jurisdictions and stakeholders involved, more checks and balances will exist to guard against any such tendencies.

Clause 10(b) – The Collaborative Protected Areas Strategy

A collaborative approach to the creation of a strategy to meet the 20% goal is essential, and therefore is highly supportable.

Because of the complexities, limitations and consequent challenges that stem from Nova Scotia's ownership pattern (i.e. the extent of private ownership, as noted above), it is clear that a large proportion of additional protected lands as needed to meet the 20% goal (i.e. in the order of 330,000 hectares, if outstanding designations proposed in the 2013 Parks and Protected Areas Plan are taken into account) must come from existing Crown lands.

With the Department of Environment and Climate Change responsible for protected areas and the Department of Natural Resources and Renewables responsible for Crown lands (and corresponding forestry and other resource uses of these lands), effective collaboration will be essential. Unfortunately the pattern to date, respecting protected area planning and establishment, has been characterized by land use competition and contention between the two departments – with Environment proposing candidate areas for protection and Natural Resources typically opposing (or if not outright opposing, pushing back in various ways and to varying degrees).

Legislation requiring a collaborative approach therefore is a positive step toward addressing this issue. However, legislation is not always effective in overcoming intransigence based on deeply-rooted perspectives and patterns of behavior. Committee members need only reflect on Nova Scotia's endangered species legislation and the recent court finding that the Province, through Natural Resources, is failing to comply with its own legislation.

The essential need is for a comprehensive land use planning approach. The ground work already has been prepared through the amendment of the Crown Lands Act in the Spring 2021 session of the legislature, when the purpose clause was amended to recognize the role of Crown land in serving a variety of objectives and uses – including, but also in addition to, forestry – as well as the role of Crown land use planning in supporting [or guiding] decisions regarding coordination of these various objectives and uses (as set out in clauses 2(a) and 2(c) of the amended Crown Lands Act that received Royal Assent on April 19, 2021 (see below)).

2 The purpose of this Act [i.e. the Crown Lands Act] is to

(a) provide the legislative and regulatory framework that will ensure Crown lands are sustainably used, protected, and managed to maintain and enhance biodiversity and considers climate change and for purposes that include wilderness conservation, recreation, economic opportunity in forestry, tourism and other sectors, community development, and for cultural, social and aesthetic enjoyment of Nova Scotians.

(b) require that forestry leasing and licensing on Crown lands provide equitable stumpage rates, provide adequate investments in forest improvements and establish an overall preference for timber produced on privately owned land; *and*
(Clause 2(b) is not relevant to the EGCCRA submission, but is included for completeness of the reference)

(c) support the range of purposes set forth in clauses (a) and (be) through land-use planning for Crown lands.

Because of the split of responsibilities between Environment (for protected areas) and Natural Resources (for Crown lands), organizational structure and processes need to be fine-tuned to ensure collaboration can occur efficiently and effectively. The importance of this aspect is demonstrated by shortcomings experienced to date in implementing the recommendations of the Lahey Report, particularly regarding the triad approach – although Environment is responsible for one of the three so-called legs of the triad, Environment is not represented on the Natural Resources Minster's Advisor Committee on the implementation of Lahey, and the committee has focussed on the two legs of the triad that are of most interest to forestry.

Committee members (i.e. Law Amendments) therefore is urged to amend Section 10 to require a coordinated public land use planning process, for Crown lands and provincial protected areas, in order to enable and facilitate the collaboration (to be achieved through effective coordination) as required in Clause (b).

Section 10(c) Implementation of Ecological Forestry on Crown land

Implementation of the Lahey Report, is long overdue and therefore is highly supportable, particularly given recognition that the recommendations therein were accept by Government almost three full years ago.

It is concerning that this commitment is limited to only those recommendations that apply to Crown land and, via the triad model, to other provincially-owned lands designated as protected areas. However, this concern perhaps reasonably can be rationalized as a strategic priority, especially in light of the debate last spring over the biodiversity legislation. Based on that experience, the case can be made that it makes good sense for the Province to "get its own house in order" before addressing private lands.

As emphasized in previous discussion relating to Clause 10(b), implementation of the triad model requires a comprehensive land use planning approach. Fundamentally, the triad model is a very simplistic approach to land use planning Crown lands, albeit rather narrowly conceived from a forestry perspective. Consistent with the Spring, 2021 amendments to the Crown Lands Act (and with Lahey's

Recommendation 19), Crown lands should be managed in recognition of a variety of objectives and uses, and not zoned through a forestry lens, which, admittedly somewhat cynically put, amounts to assuming forestry to be the default use of Crown land, essentially as follows:

- protected areas (lands lost to forestry)
- matrix lands (lands where forestry activity is constrained due to other interests), and
- high production forestry lands (areas where industrial forestry activity predominates).

Clearly, Crown lands should be managed for the benefit of Nova Scotians and, this being the case, with recognition being given to a wide variety of interests and objectives, including forestry.

Committee members therefore are urged to amend Section 10 to require a coordinated public land use planning process, for Crown lands and provincial protected areas, in order to enable and facilitate the collaboration (to be achieved through effective coordination) as required in Clause 10(b) and the implementation of ecological forestry on Crown land as required by Clause 10(c).

Section 10(d) – The Triad Model of Ecological Forestry

The intent of this clause is confusing, and therefore difficult to support, or oppose, in the absence of greater clarity.

Firstly, terminology is an issue. The Lahey Report refers to the triad model of ecological forestry (not the "triad model of forest management" as currently used in Clauses 10(c) and (d). The wording not only is inconsistent with the Lahey Report but also with the Crown Lands Act, which was amended in part to comply with Lahey's recommendation (i.e. # 19) to remove the forestry bias from its statement of purpose.

Further, given the two-year timeframe indicated for the determination of the percentage of land to be allocated to each pillar (or zone) of the triad, the implication is that some unspecified type of planning process is intended to be undertaken to zone the Crown lands in keeping with the triad categories – which presumably would be the basis for determining or confirming the respective percentages of the triad categories (i.e. once the triad zones had been delineated).

Recognizing the Spring 2021 amendments to the Crown Lands Act, the needed planning process should not be forestry-driven, but rather a comprehensive land use planning process as per Section 2(c) of the amended Crown Lands legislation (refer to Page 3). If so, and given the variety of interests and objectives that are recognized in the Crown lands legislation, parallel objectives should be set for the various interests so recognized.

There clearly is lack of clarity regarding the appropriate process for planning Crown land and the implementation of the triad model, and a corresponding lack of understanding regarding land use planning principles and processes. What is clear, from the Lahey Report (Recommendation 19) and the resultant amendment of the Crown Lands Act), is that Crown lands should not continue to be planned and managed primarily through a forestry lens. Unfortunately, the wording of Clauses 10(c) and 10(d) (and of course the extremely slow progress on the implementation of the Lahey Report)

strongly suggests that the Natural Resources department remains entrenched in a forestry-dominated mindset.

Committee members therefore are urged to amend Section 10 to require a coordinated public land use planning process, for Crown lands and provincial protected areas, in order to enable and facilitate the collaboration (to be achieved through effective coordination) as required in Clause 10(b), implementation of ecological forestry on Crown land as required by Clause 10(c), and effective application of the triad zoning model for the allocation of Crown lands as referenced in Clause 10(d).

Conclusion

Based on the preceding discussion, it is recommended that the following amendments be considered to: (1) provide greater clarity and consistency with the spirit and intent of the Lahey Report; (2) maintain compatibility with the recently-amended Crown Lands Act; and (3) promote a collaborative land use planning approach for Nova Scotia's Crown lands and protected areas.

Given the target date of December 31, 2023 for completion of the proposed collaborative protected areas strategy and finalization of the triad zoning model for the allocation of Crown lands, it is essential that forestry harvesting decisions over the interim period (i.e. until that target date is reached and/or said planning initiatives have been completed) be coordinated between Environment and Climate Change and Natural Resources and Renewables. **In the absence of effective coordination, as recommended below, the only other credible approach is to place a moratorium on forestry harvesting on Crown land over the period when plans are being prepared.**

10 The Government's goals with respect to the protection of land are

(a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

(b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;

(c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" ~~prepared by William Lahey in 2018, through the triad model of forest management~~ that prioritizes the sustainability of ecosystems and biodiversity in the Province; and

(d) to support the goal in clause (c) with a comprehensive land use planning process for the~~identify by 2023 the percentage~~ allocation of Crown land dedicated to each pillar of the~~—~~ triad model of ecological forestry ~~management referred to in clause (c)~~ by December 31, 2023~~.~~; and

(e) to ensure coordination of protected area, Crown land use and forestry management planning by requiring, over the interim period ending December 31, 2023, forestry harvesting plans to be jointly approved by the responsible Ministers.

From: [redacted]
To: Office of the Legislative Counsel
Subject: Bill 57 feedback
Date: November 1, 2021 8:42:16 AM

Hello,

I'm Emily LeGrand, and I'm 34, which means I was born at 349 parts per million of CO2 in the atmosphere, which is also a widely recognized "safe" amount of CO2. 1987 is also the year the Earth went into ecological overshoot, which is when we use more resources than can be regenerated in a given year. We've known about climate change and the need to act to reduce emissions for my entire life.

I have spent much of my life managing my anxiety and heartbreak around the knowledge that I live in an era of ecological crisis, and it has informed all of the work I have undertaken. It often feels very lonely to know that if the status quo continues, I'll live to see massive ecological and human destruction. I look around me, and get overwhelmed with how much needs to be different if we are to survive. And we are already there, though living in Canada insulates us a great deal from these realities.

So it is heartening to see that a PC government is creating legislation in my province to address the realities of the climate emergency. I join my colleagues in supporting the letter led by the Climate Emergency Unit to ask for earlier targets, clear deadlines and accountability measures for meeting them, as well as full emergency mode response. But I just want to remind you that that this work crunch we have ahead of us is the logical end result of ignoring the issue for my entire life. It is normal to feel daunted by that. So please don't get irritated at those of us who have been invested in humanity, its future, and fellow living species who are coming to you saying "good, finally, thank you, but not enough, not fast enough, please commit to more", but instead take a moment to accept that we are in this last minute situation because we, collectively and politically, have chosen to ignore the natural laws of the Earth as interpreted for us by climate scientists for decades, and have no one to blame but ourselves. And that we now need to take that all in stride, and not war against it, but step up as fully and wholeheartedly as we can now, and do what it takes. And to recognize that if we are able to do that, and we legislate and implement the transition we need, it will usher a greater level of equity, maturity, wisdom and wellbeing for humanity. Courage, not regret or blame, and face the challenge, please and thank you.

Sincerely,
Emily LeGrand

--
Emily LeGrand (she/her)

Book & Document Indexer
Emilylegrand.com
Climate Organizer

https://www.patreon.com/emilyclimateaction
I am still learning about what it means to live and work on unceded Mi'kmaq territory.

Nova Scotia's Carbon Sinks and 2050 Net-Zero Scenarios

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27 August 2021
Revised: 29 October 2021

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Executive summary

In 2019, the Nova Scotia legislature passed *An Act to Achieve Environmental Goals and Sustainable Prosperity*, and in 2021 the *Environmental Goals and Climate Change Reduction Act* was introduced, both of which set an emissions target for 2030 (at least 53% below the levels that were emitted in 2005) and stated that the province would reach net-zero emissions by 2050 (by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures).

The 2030 target can be achieved if the Atlantic Loop is completed, giving the province access to power from Hydro Québec, as explained in An Analysis of the Greenhouse Gas Emissions Reduction Targets in Nova Scotia's Environmental Goals and Sustainable Prosperity Act of 2019.

Nova Scotia is not alone in its pledge to achieve net-zero by mid-century; an increasing number of other organizations and jurisdictions are doing the same thing. Net-zero requires an entity to balance its actual emissions from all emissions *sources* and any emissions *sinks* it may claim (typically a combination of changes in land use or forestry, or both, technologies for carbon capture and use or carbon capture and storage in geological structures, and emissions credits purchased in emissions trading systems):

$$Total\ Emissions = Emissions\ sources - Emissions\ sinks$$

If the $Total\ emissions$ are zero, the entity has reached net-zero, and if they are less than zero, the entity could sell the emissions as credits; however, if $Total\ emissions$ are greater than zero (i.e., the $Emissions\ sources$ exceed the $Emissions\ sinks$), the entity will need to reduce its emissions in another way, such as purchasing emissions credits.

This report examines Nova Scotia's existing emissions sinks and possible geological stores. It begins with an examination of the different types of emission sinks and the technologies for capturing and storing carbon. Natural sinks (forests, croplands, and wetlands) and carbon capture and storage technologies (direct air capture or DAC and geological structures) are reviewed, first in terms of how the process works, then the process's ability to capture carbon, and finally, the advantages and disadvantages of the process.

This is followed by a detailed analysis of Nova Scotia's natural sinks, the strength of their carbon flux, limitations on their long-term storage ability, the threats facing the sinks (such as drought, fire, or excess moisture), and the vulnerabilities of the sink to these threats. The report has found that in 2019, the province's forests and wetlands absorbed about 11.6 Mt CO_2e, while the croplands emitted about 0.15 Mt CO_2e. This is summarized in Table 1 of the report.

Table 1: Nova Scotia's 2019 carbon sinks baseline summary

Sink	Potential
Forests	9.7 Mt CO_2/y absorbed
Cropland	0.15 Mt CO_2e/y released
Wetlands	1.91 Mt CO_2e/y absorbed

The report also examines the potential for geological sequestration in the province. With the proper carbon capture and storage technology, the potential for carbon storage will be in gigatonnes (Gt) of carbon rather than megatonnes (Mt). This could be financially beneficial to the province and its development needs to be a priority

To get an understanding of the emissions reduction requirements from the province's 2019 levels, we considered three net-zero scenarios for the province in 2050 determined by the CO_2 flux strength: constant strength (the sink strength in 2050 is the same as in 2019), increasing strength (sink strength

increases at different, evidence-based rates), and decreasing strength (the sink strengths decrease by 10% of the 2019 capacity per decade).

As Figure 3 from the report shows, in the increasing flux strength scenario, total emissions reduction would be about 13.9 Mt CO_2e from natural sinks (wetlands: -2.1 Mt, croplands: -0.2 Mt, and forests: -11.6 Mt). Since the province's total emissions in 2019 were about 16.2 Mt, the province would need to reduce its emissions by about -2.3 Mt. As we showed in our report on the province's 2020, 2030, and 2050 emissions targets, if the province meets its 2030 target of 10.9 Mt, it will have easily surpassed this, making it a net sink.

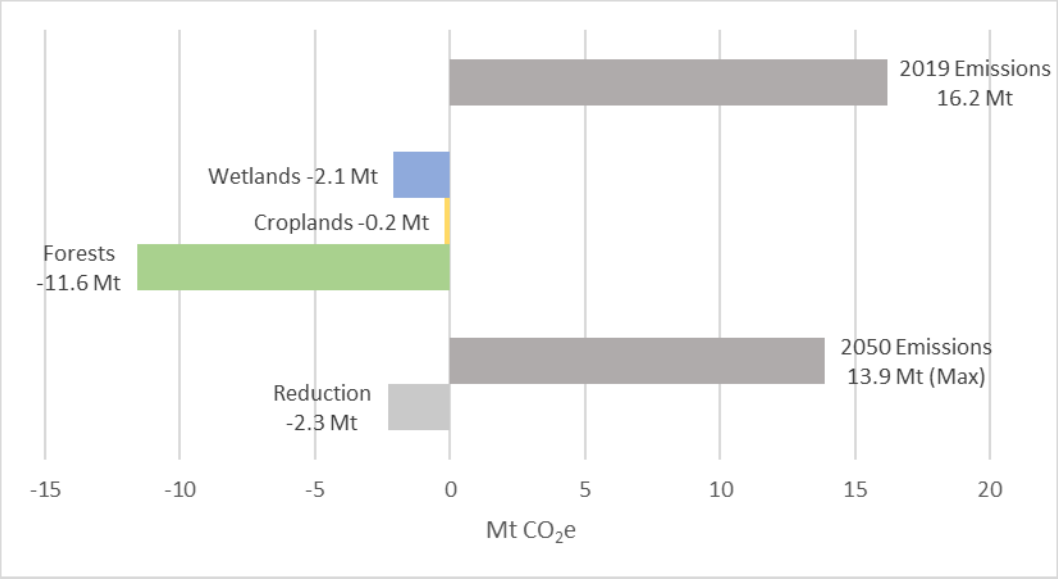

Figure 3: Emissions sinks and sources for the increasing sinks scenario

The three flux-strength scenarios were chosen to give an understanding of the size of the reduction the province would need to attain in 2050, depending on the state of the sinks. In the case of constant and increasing flux strengths, the province would have achieved net-zero by 2030 if the province's 2030 emissions target is met. However, even if the target is met, if the province's sinks weaken by 10% (something possible if extreme climate events become more likely and increase the threats to the sinks), the province will need to halve its 2019 emissions, requiring an additional 3 megatonnes of reduction from 2030 levels).

Table 2: Key results from the net-zero emissions scenarios to 2050

Sink Scenario	Projected total sink flux (Mt CO_2e)	Maximum allowable anthropogenic emissions (Mt CO_2e)	Change in anthropogenic emissions (2019-2050)	
			Mt CO_2e	Percent
Constant	-11.5	11.5	-4.8 Mt CO_2e	-29%
Increasing	-14.0	14.0	-2.3 Mt CO_2e	-14%
Decreasing	-7.9	7.9	-8.3 Mt CO_2e	-51%

The report concludes with a summary of the research.

Recommendations

The report makes seven recommendations:

1. *Conduct a complete and accurate biannual assessment of the province's greenhouse gas (GHG) fluxes of the biological sinks (such as forests, croplands, wetlands, and seagrass meadows)*.
2. *Measure, report, and verify the carbon-related impacts of the threats to Nova Scotia's biological sinks and conduct an economic and carbon flux assessment of the potential solutions to reducing the threats and vulnerabilities of the sinks*.
3. *Interim emissions reduction targets should be established*.
4. *Efforts should continually be made to reduce emissions beyond 2050*.
5. *Introduce tax incentives for carbon captured in natural sinks to promote the maintenance of our efforts to increase their carbon capture ability*.
6. *If the purchase of negative emissions is necessary, it must be sustainable*.
7. *Since biological sinks are at risk from extreme climate events, the province must research and if possible, develop its geological storage capacity*.

Final thought

As in our report on our report on the province's 2020, 2030, and 2050 emissions targets, we conclude with the question, if the province is unable to achieve net-zero by 2050, who pays, other than future generations?

Nova Scotia's Carbon Sinks and 2050 Net-Zero Scenarios

Mark McCoy
Electrical and Computer Engineering
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Professor Larry Hughes, PhD
MacEachen Institute for Public Policy
Electrical and Computer Engineering
Dalhousie University

Introduction

In December 2015, world leaders agreed to the Paris Agreement. By November 2016, sufficient countries had ratified the agreement to bring it into non-binding force. Central to the Agreement is Article 2.1(a) which states:

> *Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.*

In 2020, the average global temperature was approximately 1.2°C above pre-industrial levels. According to the Intergovernmental Panel on Climate Change (IPCC) models, in order to limit global warming to 1.5°C or have minimal increase over this temperature, the world must have reduced net anthropogenic CO_2 emissions to roughly 55% of 2010 levels by 2030 and achieved net-zero CO_2 emissions by 2050.

To reach net-zero emissions, a jurisdiction must balance its actual emissions from all emissions *sources* and any emissions *sinks* it may claim (typically a combination of changes in land use or forestry, or both, technologies for carbon capture and use or carbon capture and storage in geological structures, and emissions credits purchased in emissions trading systems):

$$Total\ Emissions = Emissions\ sources - Emissions\ sinks$$

It is important to note that reaching net-zero emissions does not necessarily require that all anthropogenic emissions are eliminated, it just means that the same volume of emissions that are released by a source are absorbed by sinks.

To reach net-zero emissions by 2050, CO_2 emissions must be both reduced (through the use of zero-emissions energy sources and potentially through energy efficiency measures) and removed (using CO_2 sinks).

In late 2020, Canada announced that it plans to achieve a 30% reduction in emissions by 2030 and net-zero by 2050.

Nova Scotia had legislated a 2050 net-zero target in late 2019 when the Legislature passed *An Act to Achieve Environmental Goals and Sustainable Prosperity*. Following on from this in October 2021, Nova Scotia's Minister of the Environment and Climate Change introduced the *Environmental Goals and Climate Change Reduction Act* to the Nova Scotia legislature. Clause 6 of the proposed legislation states:

> *The Government's targets for greenhouse gas emissions reductions are*

> *(a) by 2030, to be at least 53% below the levels that were emitted in 2005; and*
>
> *(b) by 2050, to be net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures.*

Based on the 2030 goal in the Act, 2030 emissions should be at most 10.9 Mt CO_2e.

The Act is non-specific with respect to its 2050 target, allowing regulations to be established as required. However, given the importance of reaching net-zero by 2050 or sooner, the province should develop legislation that addresses how net-zero will be achieved, both through emissions reduction and sink protection, enhancement, and development.

This report takes a first step in addressing how Nova Scotia can achieve net-zero by examining the province's emission sinks.

The report evaluates Nova Scotia's current net emissions and estimates future net emissions. This is done through an analysis of Nova Scotia's existing carbon sinks and examining three different 2050 sink scenarios. The maximum allowable anthropogenic emissions to meet the net-zero target will be determined based on the projections of the sinks, providing clarity for the legislation and what is possible.

The report first reviews carbon sinks, their processes and, in some cases, technologies. Following this, a 2019 Nova Scotian baseline of known carbon sinks and the province's geological sequestration strength is presented along with the threats and vulnerabilites to those sinks and potential solutions to reducing the impacts of the threats. Once the baseline is established, the sinks will be projected under different scenarios to determine the maximum allowable anthropogenic emissions that still meet the province's climate targets. Finally, recommendations that were produced as a result of this research will be provided.

Sections of this report were used in a submission to the Province of Nova Scotia as part of public consultations regarding the Sustainable Development Goals Act.[1]

[1] The report, "An Analysis of the Greenhouse Gas Emissions Reduction Targets in Nova Scotia's Environmental Goals and Sustainable Prosperity Act of 2019", was submitted by Larry Hughes and Mark McCoy on 26 July 2021.

Review of Carbon Sinks

A sink is "any process, activity or mechanism which removes a greenhouse gas from the atmosphere" . Carbon dioxide sinks (also referred to as carbon sinks in this report) are sinks that remove CO_2. There are two kinds of carbon sinks: natural and artificial. Carbon sinks require the sequestration of the CO_2 they capture for an acceptable amount of time if they are to be considered for mitigating climate change. Ideally, the CO_2 would be sequestered permanently or for thousands of years. In this report, a natural sink is a carbon sink that captures CO_2 using processes that occur naturally on Earth.

If a sink is enhanced by humans, but its main process is naturally occurring, this report will consider the sink as natural. In this report, an artificial sink is a carbon sink that captures CO_2 using methods developed by humans. There are three natural sinks that are examined in this report which are relevant to Nova Scotia: forests, croplands, and wetlands. The artificial sink that is examined in this report is direct air capture in combination with carbon sequestration in geological formations. Finally, some other carbon sinks that were not the focus of this report will also be discussed. All monetary figures presented in this section are in 2019 USD.

Forests, Croplands, and Wetlands

The land sink was the largest carbon sink available globally in 2019. This subsection of the report will examine how forests, croplands, and wetlands work as carbon sinks, their ability to capture and sequester carbon, and the advantages and disadvantages to them working as carbon sinks.

How it Works

Various forms of vegetation absorb carbon dioxide from the atmosphere through direct contact. Aquatic plants obtain CO_2 through contact with CO_2 in water, air, or both (if not fully submerged). Plants use photosynthesis to uptake CO_2 and some is released back to the atmosphere through respiration. The retained CO_2 is eventually converted into materials for the structural material of the plant, such as bark or leaves; this is how carbon is stored in plants, and when vegetation dies, it decomposes and begins to release the carbon that it stored. When plant products burn, such as in wildfires or intentional burning. The soil that vegetation is in can also contain a significant amount of the carbon in a vegetated area in the form of soil organic matter (44% of forest carbon is stored in the live vegetation and 45% of forest carbon is stored in the form of soil organic matter).

Three major areas of vegetation for carbon sinks are forests, croplands, and wetlands. There are various proposals on how best to capture carbon by managing these three areas of vegetation, such as coastal blue carbon and terrestrial carbon removal and sequestration (TCRS).

Coastal blue carbon is a carbon capture and sequestration (CCS) method that involves tidal wetlands and seagrasses capturing carbon and storing it in the structural material of the plants as well as burying plant organic carbon in their soils. Tidal wetlands can expand both along the sea floor and vertically (they must expand vertically at the same or greater rate of rising sea levels), potentially increasing the amount of carbon they can capture and sequester. Most of the organic carbon collected in tidal wetlands is a product of the wetlands themselves. While coastal blue carbon is a natural process, with human involvement, its ability to capture and store carbon can be improved through measures such as restoring coastal wetlands; improving the carbon storage of coastal areas by burying high-carbon materials that were not made in the coastal ecosystems in them; managing coastal wetlands in such a way that allows their area to increase

with rising sea levels and that increases or maintains the rate at which organic carbon is buried over time; and preventing wetlands from being drained.

TCRS is a CCS method that involves land-based plants capturing CO_2 and storing it in the structural materials of the plants as well as storing carbon in the soil. Increasing the amount of carbon stored in forests requires planting and preserving more carbon-dense trees, or protecting more trees from being lost (through natural death, harvesting, or fire), or both. Increasing the amount of carbon stored in soil requires adding more plant matter to the soil, decreasing the decomposition rate of soil organic matter into CO_2, or both. As with coastal blue carbon, TCRS is a natural process, but humans can improve its ability to capture and store carbon. Various practices of TCRS can be divided into the types of the land that they are used on, such as forests, grasslands, and croplands. Some forestry practices include avoiding deforestation; afforestation and reforestation; management of forests to restore and maintain their health, and increase their growth; increasing the time before harvest of trees to maintain the carbon capture ability of the trees; and preserving more harvested wood and wood products (a developing practice which may improve carbon/CO_2 removal). These practices have the potential to increase carbon capture and reduce CO_2 emissions associated with wood products. In terms of grassland/cropland practices that help remove and reduce CO_2 emissions, they can be divided into two categories: conventional (already established) and frontier (developing). Some conventional grassland/cropland practices are including trees in agricultural land and management techniques such as not tilling the ground as frequently or at all before planting crops (the CCS ability of tilling practices varies based on the climate and soil characteristics). Some frontier grassland/cropland practices include: adding biochar (solid carbon by-product resulting from the biomass-to-fuel process) to soil to store carbon and increase crop productivity; placing high-carbon surface soils deeper underground and low-carbon soils near the surface to allow more carbon to be absorbed and potentially increase the amount of time carbon remains in the soil; and modifying current agricultural plants to increase the amount of carbon sent to the plant roots.

Carbon Capture Ability

The global land sink captured an estimated 11.50 $GtCO_2$ in 2019, which is approximately 27% of the global CO_2 emissions, while land-use changes were responsible for 6.60 Gt of global CO_2 emissions. The potential annual global CCS ability and CO_2 capacity of coastal blue carbon with the technology and knowledge in 2019 was 0.13-0.80 $GtCO_2$/y and 8-65 $GtCO_2$. The potential annual CCS ability and CO_2 capacity of TCRS practices with the technology and knowledge in 2019 was 5.5-12 $GtCO_2$/y globally and 660-1215 $GtCO_2$ globally, respectively. There are significant variations in the carbon absorbed by the land between years, with variation reaching as high as 4.62 $GtCO_2$/y in the previous decade. This variation is connected to changes in temperatures and stored water in tropical regions, and can result from weather events.

There are multiple factors that affect the carbon capture ability of vegetation and the land sink. The amount of carbon absorbed by vegetation on the land is believed to increase when higher atmospheric CO_2 concentrations increase photosynthesis, causing more plant growth and thus, more carbon to be stored, and when forests reclaim former agricultural land. While increased CO_2 allows for plants to grow more, plants are still limited by other materials that may not be as plentiful to grow. It has been recently found that globally, the effectiveness of 86% of terrestrial ecosystems at capturing CO_2 is decreasing. The vegetation sink can be divided into two categories: vegetation that quickly acts to reach equilibrium with the CO_2 in the atmosphere and the vegetation that is not in equilibrium with the CO_2 in the atmosphere. Types of vegetation that fall into the first category are leaves and small roots, whereas those that fall into the second category are live wood and long-lasting, land-based dead organic matter. Should the CO_2 concentration in the atmosphere decrease over a century, the land is predicted to remain a carbon sink due to the absorption of CO_2 by the vegetation that does not reach equilibrium with the atmosphere, despite the vegetation that releases CO_2 during this time. When more CO_2 is removed from the

atmosphere, the effectiveness of vegetation as a carbon sink will decrease. In a business-as-usual scenario, it is predicted that the land carbon sink will become a land carbon source as a result of factors such as plants lacking resources other than CO_2 to grow and the death of forests to high temperatures and drought. The removal of the trees through methods such as harvesting, natural death, or fire affects the carbon capture ability of trees. Also, due to changes in albedo when conducting afforestation/reforestation at high latitudes, the result is an overall increase in temperature even after taking into account the temperature decrease from the emissions reduction from trees.

Advantages/Disadvantages

Some advantages to coastal wetlands are that they help to protect coasts during storms, provide homes for wildlife, and reduce the strength of waves. Coastal blue carbon practices can also reduce the flood risk to humans by reducing the population of regions that are becoming more prone to flooding. Another major disadvantage to coastal blue carbon is that there is risk that the practices used, such as shoreline modification, will ultimately harm the coastal ecosystem. Some advantages to TCRS practices are that the practices can be viewed as repairing damage done to the ecosystem, they may improve ecosystem diversity, and improve soil quality. A significant disadvantage to these practices is that there might be competition for land with other economic needs, such as food production, so what is technically possible for carbon capture may not be necessarily feasible. Another major disadvantage is that the effects of the practices can be reversed by methods such as harvesting, where the carbon that was stored gets released. One final disadvantage to some terrestrial practices is that adoption rates for some of these practices are low, preventing the effects from being realized. The estimated costs to implement the CO_2 removal practices of coastal blue carbon and TCRS span a relatively small range. The cost for coastal blue carbon burial is estimated to be \$10/t CO_2 and the cost for TCRS is estimated to range \$15 to \$100/t CO_2.

Direct Air Capture

As the name suggests, direct air capture (DAC) technology captures CO_2 from the air. While DAC is not a sink by itself, the combination of DAC with carbon sequestration in geological formations is a carbon sink. DAC has the potential to provide significant carbon capture abilities. This subsection examines how DAC works, the ability of DAC to capture carbon, and its advantages and disadvantages.

How it Works

In a DAC system, air is pulled from the atmosphere into an air contactor where CO_2 is removed from the air. DAC systems are carbon capture systems; they do not store CO_2. At present, DAC systems can capture CO_2 using liquid solvents or solid sorbents.

Carbon Engineering's DAC systems use a liquid solvent in the form of a KOH solution and capture 75% of the CO_2 passing through their DAC system. The liquid solvent DAC system uses an aqueous solution of KOH as well and can capture 75% of atmospheric CO_2 passing through the air contactor at an ambient concentration of 400 ppm. In the liquid solvent DAC system, there are five further processes, including causticizing, calcinating, slaking, clarification and filtering, and air separation of O_2, where the KOH is recovered, and high-concentration CO_2 gas is produced. The following are the reactions for the different processes:

$$2KOH_{(aq)} + CO_{2\,(g)} \rightarrow H_2O_{(g)} + K_2CO_{3\,(aq)} \text{ (Air Contactor)}$$

$$K_2CO_{3\,(aq)} + Ca(OH)_{2\,(aq)} \rightarrow 2KOH_{(aq)} + CaCO_{3\,(s)} \text{ (Causticizer)}$$

$$CaCO_{3\,(s)} \rightarrow CaO_{(s)} + CO_{2\,(g)} \text{ (Calciner)}$$

$$CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2\,(aq)}$$ (Slaker)

Not only is KOH recovered through these processes, but materials for the various processes are recovered throughout the system reactions shown above.

In DAC systems that use solid sorbents, air is brought into contact with a solid, CO_2-adsorbing material which captures the CO_2 on its surface. The material is then heated, or placed in a vacuum, or both which releases the CO_2 from the material at which point it can be processed for sequestration. The CO_2-adsorbing material is then cooled to begin capturing more CO_2.

Once CO_2 is captured through either type of DAC system, it must be stored; for example, in geological formations.

Carbon Capture Ability

The carbon capture ability of DAC is mainly constrained by finances rather than technical constraints. The sequestration of the CO_2 that is captured by DAC systems does have limitations in the form of feasible geological sequestration locations and safe storage capacity. DAC systems can be constructed anywhere, but the infrastructure and resources to operate DAC systems must be in place as well, potentially limiting DAC locations. The energy that is required to run the DAC systems could be obtained from renewable and/or non-renewable sources, the use of renewables increasing the net CO_2 capture ability of the DAC system and the use of non-renewables decreasing that ability. To increase the net CO_2 capture ability of DAC systems, non-emitting energy sources should be employed.

If natural gas was used as a thermal energy source for liquid solvent DAC, the system could absorb the CO_2 produced by the combustion of the natural gas while also absorbing as much atmospheric CO_2 as possible. This reduces the volume of atmospheric CO_2 that can be captured. The employment of power sources at the location of the DAC system has the potential to be limited by land availability. If there are multiple air intake points, it is important to place them such that the air being pulled in by the air intakes at each point has an ambient concentration of CO_2, allowing for optimal carbon capture.

Advantages/Disadvantages

The major advantages of DAC are its potentially large annual CO_2 capture abilities and relatively small land usage to achieve those ends. Also, DAC allows for CO_2 product at various purities to be sold to the market. The most significant disadvantage to DAC is that it is presently an expensive technology for CO_2 removal, with average costs ranging from roughly \$90/t to \$900/t of net CO_2 captured.

The limited deployment of DAC systems has resulted in a lack of data for analyses to help policymakers understand the costs of negative emissions through DAC systems that are required to meet the climate goals of the Paris Agreement. One advantage is that it does not seem to be a lack of fundamental understanding of the technology that is slowing its uptake.

Some disadvantages of DAC include the significant reduction in local CO_2 concentrations may have a detrimental impact to local ecosystems; potential chemical emissions from solid sorbent DAC systems may harm the environment; more research needs to be conducted into water production and use in DAC; and to reach large scale CO_2 capture via DAC, a significant amount of money needs to go towards research and development. Another significant disadvantage of DAC systems is that they are not carbon sequestration technologies themselves – they need another method to store the carbon they capture to be useful. Looking past 2050, it has been recently found that DAC could decrease the costs of meeting international climate targets, but doing so would require up to 25% of worldwide energy in 2100; this is a significant potential disadvantage.

Carbon Sequestration in Geological Formations

Carbon sequestration in geological formations (CSGF) is an artificial carbon sink support method that works with bioenergy with carbon capture and sequestration (BECCS) and DAC by acting as the storage method. Here we examine how CSGF works as a carbon sink, the ability of CSGF to sequester carbon, and the advantages and disadvantages to CSGF working as a carbon sink.

How it Works

CSGF is a primary CO_2 storage method for both BECCS and DAC systems. This technology is simply a storage method for the CO_2 that other technologies capture. Captured CO_2 must first be compressed into a supercritical fluid before it can be sequestered, allowing for more CO_2 to be stored. The fluid is then pumped into an underground geological formation for long-term storage. The formation must be deep enough that the underground pressure and temperature causes the fluid to stay compressed and supercritical. The geological formations that can be used for CSGF must have porous rock that fluids can pass into and their tops must be sealed by rock that is difficult or impossible for fluids to pass through. Due to the density of supercritical CO_2 in relation to fluids that fill the rock pores, the CO_2 will rise to the top of the rock formation and be stored permanently if there are no leakage pathways; sedimentary rocks can be used for CSGF.[2] Some reservoirs for CO_2 storage include depleted oil/gas deposits and deep saline aquifers – both onshore and offshore locations. One method of CSGF injects CO_2 into oil/gas reserves to increase extraction while also storing CO_2, a process referred to as enhanced oil/gas recovery. To increase the trapping ability of CO_2 in the underground reservoirs, multiple methods can be implemented, such as CO_2 (or carbon) mineralization.

Carbon Storage Ability

By 2019, major saline aquifer CSGF projects sequestered individual amounts between 0.3 and 1.2 Mt CO_2/y. The potential global CO_2 capacity of saline aquifer CSGF given the knowledge and technology in 2019 was 5,000 to 25,000 Gt CO_2. Enhanced oil recovery projects can be carbon sinks provided that substantially more CO_2 is injected into the reservoir per barrel of oil produced.

One factor that affects the ability of CSGF to store CO_2 is the potential for leaks in the CO_2 reservoir. Leaks could be the result of cracks in the low permeable rock. If the sequestration site is not near the capture site, transportation will be required to the sequestration site, potentially resulting in CO_2 emissions (i.e., transportation on a ship burning fossil fuels). Consequently, the net CO_2 captured and sequestered could decrease. Ideally, sequestration sites would be near to the location of carbon capture to avoid transportation costs and potential emissions. It is important to note that there is a maximum sequestration rate for CO_2 in CSGF that is capped where unsafe pressure build-up in a reservoir is not reached. An important factor which limits the CO_2 sequestration capacity of CSGF is that injecting CO_2 into reservoirs can result in a build-up of pressure that may cause seismic activity or break the reservoir seal. Once stored in the reservoir, unless there is leakage, the CO_2 will remain in the reservoir for an indefinite period.

Advantages/Disadvantages

The most significant advantages of CSGF are: it has a large potential CO_2 storage capacity; there is a significant amount of research and experience with CSGF; and storage of CO_2 is permanent provided there are no leaks. Additionally, the cost of CO_2 sequestration is very low at \$7 to \$13/tCO_2. Major disadvantages of CSGF include implementation of CSGF may result in further seismic activity; leakage of the CO_2 reservoir may contaminate groundwater; it requires a significant amount of research to scale up CSGF and

[2] Professor Grant Wach, Dalhousie University, personal communication, 23 June 23, 2021

guarantee its safe and consistent application; and a sequestration site may not necessarily be near high-emissions sources. Given the use of CSGF in enhanced oil recovery, another advantage of CSGF is that the oil industry could play a role in carbon sequestration should it make sense to do so, improving their oil extraction. Another significant disadvantage to CSGF is that, depending on a country's laws, it may not be explicit who is financially liable for CO_2 reservoirs long after a sequestration project has ended; this has been a major contributor to preventing large-scale deployment of CSGF. Another barrier to scaling up CSGF is the potential issue of gaining permission to conduct CSGF under lands that are owned by potentially many people, which expends time and money.

Other Sinks

Other sinks which were not examined in relation to Nova Scotia, but which may have carbon capture potential for the province include bioenergy with carbon capture and sequestration (BECCS) and carbon mineralization. BECCS is a mix between an artificial sink and a natural sink while carbon mineralization is a sink following a natural process. In their respective subsections, how the technologies work will be explained and their global carbon capture potential will be provided.

Bioenergy with Carbon Capture and Sequestration

Generally, BECCS is the process in which CO_2 is captured from the air via growing vegetation, the vegetation is used in bioenergy power plants, CO_2 is captured from the power plants, and CO_2 is then stored in geological formations. As explained above, plants capture CO_2 via respiration and store it in the materials that constitute the vegetation. While some carbon can be stored in the soil at this step, the sequestration of carbon for BECCS is focused on geological formations.

Some other methods of BECCS are: the vegetation is fermented into fuel and CO_2 from the fermentation process is captured and sequestered; and the vegetation is converted to fuel and the biochar product of this conversion is sequestered in soil as in the TCRS practice. Sources that could be used for BECCS include: energy crops grown on marginally productive cropland (of which there is a substantial amount globally); forestry plant residues; crop plant residues; and organic waste from cities. When biomass is collected from the source, it must then be transported to a consumer (including industrial consumers) for conversion into its next product (i.e., fuel, energy, or biochar, or all three). If the product is fuel, that fuel must be transported to the consumer, adding CO_2 emissions to the atmosphere which BECCS can absorb. It is important to note that emissions will vary depending on the mode of transportation as well as the distance travelled. The biomass can be converted to various products (such as heat and fuel) using multiple methods that fall under thermochemical or biological classifications, such as pyrolysis, fermentation, gasification, and simply combustion.

When biomass combustion is used for thermal or electrical power, CO_2 is produced and the methods for capturing this CO_2 are typically no different than the developing methods for CCS in a fossil fuel power plant. Some methods in which power plant CO_2 emissions are removed are where CO_2 is separated either before or after combustion. One technology of CCS used in fossil fuel power plants is CO_2 scrubbers, which remove a net of 80% to 90% of CO_2 emitted by the plant when including the extra energy and emissions for running the scrubbers. Once the CO_2 is captured from these processes, it can be sequestered in geological formations. When biomass is converted to fuel, carbon can be stored in biochar which can be added to soil for sequestration as well as a potential benefit to the productivity of the land.

The potential annual carbon capture ability of BECCS with the technology and knowledge in 2019 was 3.5 to 15 Gt CO_2/y globally. Like DAC, the CO_2 capacity for BECCS methods that store CO_2 in geological formations is constrained by the space in geological formations to store CO_2 safely and feasible geological

sequestration locations. The CO_2 capacity for the BECCS method that produces fuel along with biochar seemingly does not have capacity constraints. As discussed previously, the mode of transportation and the transportation distance for biomass can decrease the net CO_2 removal ability of BECCS to varying degrees. Truck transportation has the highest rate of CO_2 emissions per kg of biomass per km travelled, followed by train and then sea freight. A significant factor that affects the carbon capture ability of BECCS is carbon losses: for a bioenergy integrated gasification combined cycle power plant that uses CO_2 capture and sequestration and burns switchgrass, from the point of carbon capture in switchgrass to the point of sequestration of that carbon, over half of the original carbon can be lost. It is important to note that the combustion, degradation, and respiration of living things contribute to CO_2 and CH_4 emissions.

Carbon Mineralization

Carbon mineralization is a natural process that occurs when various kinds of silicates and rocks high in calcium or magnesium content are weathered. Natural carbon mineralization can capture 30 Gt CO_2 over a century. CO_2 can be stored as carbonates by reacting with the previously described materials. Some preferred types of minerals for carbon mineralization are mantle peridotite and basaltic lavas. Some of the mineralization reactions are shown below:

$$CaSiO_3 + CO_2 \rightarrow CaCO_3$$

$$Mg_2SiO_4 + 2CO_2 \rightarrow 2MgCO_3 + SiO_2$$

$$Mg(OH)_2 + CO_2 \rightarrow MgCO_3 + H_2O$$

Humans can get involved with carbon mineralization to achieve two outcomes: sequestering CO_2 in carbonate materials or both capturing and sequestering CO_2 in carbonate materials – each outcome has methods that can be taken to achieve them.

For storing CO_2, three methods can be used: ex situ, in situ, and surficial carbon mineralization. For ex situ carbon mineralization, material used in the CO_2 to carbonate reaction is brought to locations of CO_2 capture where it is reacted with CO_2 in its temporary storage substance. For in situ carbon mineralization, CO_2 that is temporarily stored in fluids are passed through viable underground rock formations to react and store CO_2 in carbonate materials. For surficial carbon mineralization, CO_2 that is temporarily stored in fluids are passed over a high surface area of certain industrial waste products (such as mining tailings) or a high surface area of reactive rocks where CO_2 can react with the material. The method for both carbon capture and storage could use in situ or surficial mineralization along with surface water as the temporary storage substance for CO_2. CO_2 from the atmosphere will dissolve in surface water naturally, so the surface water for this carbon mineralization process acts as the carbon capture component.

There is a wide range and some unknown quantities for the carbon capture ability of the various methods of carbon mineralization, given the technology and knowledge of 2019. The known values for individual sequestration-only carbon mineralization methods could be as high as 32 Gt CO_2/y for annual CO_2 removal and as high as roughly one million Gt CO_2 for global capacity. Two potential limiters of the carbon capture ability of in situ carbon mineralization are that the pores of rocks could be clogged by carbonates, preventing further carbon storage, and that the reactions that produce the carbonate materials could form a layer that protects the reactants from further reacting, potentially slowing or stopping further carbon storage. Certain kinds of rocks have higher rates of carbonation, so their abundance (or lack thereof) is important to consider when choosing a rock for carbon mineralization. For surficial carbon mineralization, some industrial waste products do not contain much calcium or magnesium, thus reducing the carbon storage capability of this method.

Nova Scotia's Carbon Sinks Baseline

To develop emissions scenarios that extend decades into the future, it is necessary to establish a baseline of the province's current carbon sinks. This section examines Nova Scotia's forests, croplands, and wetlands as carbon sinks and Nova Scotia's geological sequestration potential. The baseline year is 2019 as it is the most recent year for which key data involved in this report is available, such as the annual GHG emissions for Nova Scotia.

Nova Scotia's Forests

According to the provincial Ecological Landscape Analysis (ELA) reports for Nova Scotia's eco-districts, which use data from 2015 and 2017, the total area of Nova Scotia's forests is approximately 4.3 Mha (found by summing the forest areas provided in the ELA report for each eco-district). Assuming that this area is the area of the province's forests in 2019 and using the ELA data it was determined that forests constituted approximately 78.3% of the land area of Nova Scotia in 2019; this makes the forests Nova Scotia's largest carbon sinks by land area. This subsection will discuss the ability of forests to absorb carbon as well as the threats to the forest and vulnerabilities to events that will impact this ability.

Forest Sink Ability

The average CO_2 flux (i.e., change in CO_2 emissions) of Nova Scotia's forests was approximately -9.38 Mt CO_2/y between 2013 and 2017 and approximately -9.06 Mt CO_2/y between 2008 and 2012. This report assumes that the change in these values is linear to get the CO_2 flux for the next five-year period (2018-2022), resulting in a CO_2 flux of approximately -9.70 Mt CO_2/y for the baseline year. The data used to determine this value were collected from permanent forest sample plots (PSPs) in the province. The PSP-based estimations show only change in carbon stocks between measurement periods. Therefore, if a given plot is harvested, it is assumed that all emissions associated with the harvested wood products are emitted entirely at harvest, which will lead to an overestimation of emissions from harvested wood products that store carbon for a longer period as they decompose.[3]

Additionally, forests and PSPs were stratified by ecoregion and it is therefore assumed that the sample plots share the same carbon capture characteristics of a given ecoregion. Moreover, emissions from dead organic matter only include coarse woody debris and standing dead trees (i.e., snags) and not litter, fine woody debris, dead tree roots, or soils, which will lead to an underestimation of emissions from forests due to the decomposition of these dead organic matter pools. The total net removal of carbon from forests and harvested wood products is likely overestimated by the PSP-based data.[4]

Given that the carbon capture value for Nova Scotia's forests is likely overestimated,[5] it is important to compare it to the carbon capture value of the forests of a jurisdiction that is geographically close to Nova Scotia. Maine is one such jurisdiction, with a forested area of 17.30 million acres (approximately 7 million ha) and Maine's forests captured an estimated average net of about 15.1 Mt CO_2e/y between 2006 and 2016 (value obtained by subtracting wood product emissions from net forest uptake and converting from carbon to CO_2e). From this data, the per hectare carbon capture of Maine's forests can be estimated to be approximately 2.16 t CO_2e/ha/y. Comparing the results from Maine's forests to Nova Scotia's over a similar period (2013 to 2017) which have an estimated net per hectare carbon capture of 2.17 t CO_2e/ha/y

[3] Dr. James Steenberg, Nova Scotia Department of Lands and Forestry, personal communication, 26 July 2021)
[4] Ibid.
[5] Ibid.

(from the 2013 to 2017 flux data for the province's forests and Nova Scotia's forested area from the 2019 ELA reports), suggests the estimate for Nova Scotia is reasonable.

Threats and Vulnerabilities

There are multiple threats to Nova Scotia's forests that could reduce their ability to capture and store carbon, such as drought, fires, pests, and strong weather events.

Some potential solutions to reducing the threat of droughts to Nova Scotia's forests are to thin or intentionally burn the forest to decrease the forest density and to promote trees that can resist the effects of droughts. The likelihood of droughts happening in Nova Scotia's future is likely given that there has been a drought of any intensity during six years of the last decade and that temperatures increase with global warming.

Reducing the threat of drought consequently reduces the threat of fires to the province's forests. The risk of potentially high-damaging fires can be reduced through management practices such as prescribed burning. The likelihood of forest fires happening in Nova Scotia's future is almost certain given that there have been wildfires reported every year for the past five years and that in the rapid emissions reduction climate scenario, the province's fire season is expected to get longer.

Pests, including new pests introduced from southern climates, are considered by the province to be the highest threat to Nova Scotia's forests; to reduce the threat of these pest, the province should prepare and research forest management practices to reduce the impact of the most likely pests on Nova Scotia's forests. To reduce the threat of pests that currently inhabit the province's forests, practices to reduce their impact which already exist (such as those meant to deal with the spruce beetle) should be used (if not currently practised) and research should be conducted to improve their effectiveness or to find more effective practices. A vulnerability of Nova Scotia's forests is the vulnerability of all spruce trees to the spruce beetle during spruce beetle outbreaks. The likelihood of new pests is almost certain since it is already occurring (i.e., the hemlock woolly adelgid was reported in Nova Scotia in 2017). The likelihood of spruce budworm infestations is likely to decrease in the future should temperatures at their southern limit rise; currently, certain spruce budworm infestations cause low amounts to significant amounts of damage to large quantities of spruce-fir forests in 30- to 40-year intervals. To reduce the vulnerability of Nova Scotia's forests to pest infestations, various forest management practices can be conducted, such as decreasing the number of a pest's host trees in a forest through thinning and predicting when and where pest infestations will occur so that action can be taken to prevent further infestation. An example of a practice that is currently implemented to reduce the potential of spruce beetle infestations is removing blown down trees from an area of forest.

Some other vulnerabilities of Nova Scotia's forests are the vulnerability of tall stands of mostly spruce or balsam fir to wind damage, and the vulnerability of shallow rooted trees to wind damage. In Nova Scotia, between 2008 and 2012, two softwood tree species that were among the highest in commercial populations were red spruce and balsam fir, and a hardwood tree species that was among the highest in commercial population was red maple. The trees listed all have shallow roots which means that the province's commercial trees with some of the highest populations in their respective category were vulnerable to wind damage and likely still are. A potential solution to reducing the vulnerability of the province's forests to wind damage would be to assess areas that are high-risk and ensure that the trees do not grow too tall (since some tall trees are more vulnerable to wind damage). The likelihood of strong weather events is almost certain since hurricanes hit Nova Scotia every seven years on average, while the likelihood of extra-tropical cyclones that have winds that could result in significant damage is almost certain since cyclones of this strength hit Nova Scotia roughly once every two years.

Other threats to the province's forests are: anthropogenic actions which help the forest sink can be undone deliberately (i.e., forest clearing) or through natural disturbances (i.e., fires or windstorms), thus reversing progress; and the potential to increase the amount of harvested wood to decrease emissions by replacing higher-emissions materials like steel and concrete with harvested wood products. To reduce the threat of actions that improve the forest sink being intentionally undone, a potential solution would be to produce legislation that "locks in" the action unless the scientific community decides, in the future, that the action is ultimately harmful to the forest sink. The increase in emissions resulting from an increase in the production of harvested wood products would have to be offset by increasing the net carbon uptake of the forest through various methods such as improved forestry management practices as well as afforestation/reforestation. A serious impact from climate change is potential changes in growing season length: while potentially longer growing seasons could increase plant growth, warmer temperatures could increase carbon loss from plant respiration enough to offset some of or exceed the carbon capture from the longer growing season, presenting a significant challenge.

Nova Scotia's Croplands

In 2011, the area of cropland in Nova Scotia was 280,889 acres, and the area decreased by 4.8% to approximately 267,406 acres (or 108,218 ha) in 2016. For the baseline year of this report, the cropland area will be assumed to be the same as the area in 2016. When comparing this value to the total area of Nova Scotia calculated from the data in the ELA reports, cropland constituted approximately 1.96% of Nova Scotia's land area in 2016. This subsection will discuss the ability of cropland to absorb carbon as well as the threats to cropland and vulnerabilities to events that will impact this ability.

Cropland Sink Ability

Due to insufficient data available about the ability of Nova Scotia's croplands to absorb or emit carbon, a coarse estimate was made. The most specific data provided regarding the carbon capture ability for cropland is the Land-Use, Land-Use Change, and Forestry (LULUCF) data for the Atlantic Maritime Ecozone (AME), which is that the cropland for this region released approximately 541 kt CO_2e in 2019. This value was scaled down linearly from the cropland data of the AME to the cropland data of Nova Scotia by using the ratio of the area of Nova Scotia to the area of the AME.[6] The result of this calculation is that Nova Scotia's croplands are a source of approximately 145 kt CO_2e/y rather than a sink in 2019. Due to the coarseness of this estimate, it does not provide an accurate depiction of Nova Scotia's cropland sink. Since it is relatively small in comparison to other sinks and sources, this inaccuracy does not have a significant impact on Nova Scotia's carbon sink baseline. Currently, there is no incentive for cropland owners to focus on carbon sequestration on their cropland.[7]

Threats and Vulnerabilities

Like the forests, there are multiple threats to Nova Scotia's croplands that could make them emit more carbon via degradation of the ecosystem's ability to capture carbon. Climate change could result in an increased quantity and strength of droughts that reduce the productivity of the cropland; this means that the plants on the cropland would not be absorbing as much carbon. To reduce the effect of droughts on crops, cropland, livestock, and forestry systems can be combined in various ways on one farm. A cropland management practice that can reduce the effects of floods and droughts on croplands is planting cover

[6] The area information reproduced in the calculations is a copy of an official work that is published by the Government of Canada and the reproduction has not been produced in affiliation with or with the endorsement of the Government of Canada.

[7] Professor Derek Lynch, Dalhousie University, personal communication, 30 June 2021

crops. Another effect of climate change is that it could increase pest infestations which may require the use of pesticides – the use of which could increase energy usage for their production and distribution and potentially GHG emissions depending on the energy source used. Efforts should be made to avoid the potential emissions connected to the production and distribution of pesticides or to capture them at source points. Another threat to the productivity and survivability of cropland plants is the potential introduction of salt water to cropland. To reduce the impact of salt water intrusion, various adaptation actions can be taken, such as adding gypsum to the soil and planting cover crops; however, these are only short-term solutions.

Nova Scotia's croplands have some vulnerabilities, such as having low-lying coastal cropland (e.g., parts of the Annapolis valley) being prone to saltwater intrusion as sea levels rise. To prevent the intrusion, sufficiently high dykes should be constructed or maintained, or both, in areas that are at risk of saltwater intrusion. Other vulnerabilities are that: Nova Scotia uses unirrigated farming, making the cropland susceptible to drought; the province's soils are coarse and sloped, making them vulnerable to erosion; and the soils are low in soil organic matter, reducing their water holding capacity and structure related to water infiltration capacity.[8] This reduction in soil health related to water infiltration and retention has multiple detrimental effects: it leaves the land vulnerable to both flooding and drought.[9] The adoption of cropland management practices that increase soil organic matter would decrease the risk of both flooding and drought.[10] Some potential examples of management practices to increase soil carbon would be to include trees on cropland and the planting of cover crops and diverse crop rotations to allow inclusion of some perennial crops.[11] Increasing the amount of soil organic matter in cropland soils would increase soil structure and thus, decrease erosion.[12]

The likelihood of droughts occurring in the province's future is already discussed in the Nova Scotia's Forests subsection of this report. If sea barriers are not constructed to prevent the sea from reaching inland, the likelihood of salt water intrusion is likely given the expected sea level rise and that Nova Scotia is slowly losing land. The likelihood of flooding occurring in Nova Scotia in the future is likely given that the annual precipitation is predicted to increase in the future and that more intense rainfalls are predicted.

Nova Scotia's Wetlands

According to the most recent provincial ELA reports for Nova Scotia's eco-districts, which use data from 2015 and 2017, the total area of Nova Scotia's wetlands is approximately 383 kha (found by summing the wetland areas provided in the ELA report for each eco-district. Assuming that this area is the area of the province's wetlands in 2019 and using the ELA data, it was determined that wetlands constituted approximately 6.9% of the land area of Nova Scotia in 2019; this makes the wetlands Nova Scotia's second largest carbon sink by land area. This subsection will discuss the ability of wetlands to absorb carbon as well as the threats to the wetlands and vulnerabilities to events that will impact this ability.

Wetland Sink Ability

A study of Nova Scotian wetlands examined 55 wetlands consisting of five kinds of wetland across the province during summer of 2017. One portion of the study was to determine the GHG flux from Nova

[8] Ibid. 15 August 2021
[9] Ibid. 15 August 2021
[10] Ibid. 30 June 2021
[11] Ibid. 15 August 2021
[12] Ibid. 15 August 2021

Scotian wetlands and it was determined that the wetlands emit an average of 1.46 t CO_2e/ha/y in the form of methane and capture 6.45 tCO_2e/ha/y in the form of CO_2e, resulting in an average net capture of 4.99 t CO_2e/ha/y. For this report, the net capture rate is assumed to be the same as the baseline year. With this assumption, the net capture rate along with the area of wetlands were used to calculate the net carbon capture ability of Nova Scotia's wetlands. The province's wetlands were calculated to be a sink of approximately 1.91 Mt CO_2e/y for the baseline year.

Threats and Vulnerabilities

From Australian research which has shown how climate change will affect the CO_2 and CH_4 fluxes in wetlands in certain climate change scenarios, we believe the most significant threat to the ability of the province's wetlands to absorb carbon is climate change. According to the Australian Department of Sustainability, Environment, Water, Population, and Communities and the Wetlands and Waterbirds Taskforce, these are potential changes to the GHG fluxes in wetlands:

- Warmer climates will accelerate the rate of production of carbon dioxide and methane from wetland soils, but may also increase primary production.
- Wetter climates will increase wetland surface areas and promote carbon sequestration and increased primary production, but may increase methane emissions.
- Drier climates will increase the oxidation of carbon stores but reduce methane emissions.

Dry and wet environments could be created by droughts and floods, respectively, potentially resulting in changes to the GHG flux of Nova Scotian wetlands. Before any solution is chosen to counter the effects of increased wetness or dryness, an assessment of the GHG fluxes from a wetland in its original state should be made along with an estimate of the GHG fluxes with the solutions applied. If a solution will have lower net emissions or be a greater net sink than the original state, then the solution should be applied. An example of a solution to counter the effects of wetland soil drainage (which may result from excessive dryness) would be to rewet the soil of the wetland. A potential solution to counter the effects of wet environments on wetlands would be to drain the excess water, though the ecological effects of such an action requires further research. Some threats to coastal wetlands are coastal erosion and "sea-level rise, where inundation will threaten the survival of the largely intertidal wetland plants". To control the erosion of coastal wetlands, sediments can be added to a region; for example,

> *If continued input of suspended sediment from rivers is sufficient for sediment accretion to keep pace with a steadily rising sea-level, then carbon dioxide emissions could decrease as the tidally-flooded coastal areas increase in area and plant population size and existing inundated carbon pools are buried even deeper – provided that such landward movement of intertidal areas is not prevented by coastal squeeze such as the presence of hard sea-defences and other infrastructure.*

Management practices should be developed and adopted to allow coastal wetlands to move inland with rising sea levels and to maintain the sink. A potential technological solution to impacts of rising sea levels is to use control gates to maintain the current tides into the future; however, this should be considered a last resort.

We believe that the greatest vulnerability of the wetlands carbon sink is that its GHG fluxes are influenced by its climate. This means that unless climate change is reversed, there are a couple measures that could be taken to reduce the impacts on the sink, notably to estimate the GHG fluxes under the new climate and attempt to modify the environment where necessary and possible (as described in the previous paragraph). The vulnerability of coastal wetlands is their location – they are susceptible to both coastal

erosion and flooding from rising sea levels. The potential solutions for both issues are discussed in the previous paragraph.

The likelihood of droughts which may cause wetlands to dry was already discussed in the Nova Scotia's Forests subsection of this report. As noted in the Nova Scotia's Croplands subsection of this report, there is more annual precipitation expected in Nova Scotia's future which means that the province's wetlands could experience the GHG flux changes associated with a wet environment. The likelihood of sea level rise is considered by the IPCC to be virtually certain. The likelihood of coastal erosion continuing in the future is certain since it is considered an inevitable process.

Nova Scotia's Geological Sequestration Sites

While geological sequestration sites do not capture carbon on their own and as such, are not technically sinks, it is important to discuss them as they make up Nova Scotia's "natural" carbon storage capacity for artificially captured carbon. Nova Scotia has the potential to be an important location for CO_2 sequestration given the number of offshore sedimentary basins in the region, which have excellent potential for carbon sequestration.[13]

While work is being done to determine an estimate for the CO_2 sequestration potential in and around Nova Scotia, an estimate can be made for some potential sites that are known, namely the depleted offshore oil and gas fields.[14] For example, the volumes of oil or gas that were extracted from the Sable Offshore Energy Project, the Deep Panuke Offshore Gas Development Project, and the Cohasset-Panuke Project are 60 billion m^3, approximately 4.2 billion m^3, and 7.1 million m^3, respectively. Assuming that the volume that can be injected into the depleted reservoirs is equivalent to the volume that was extracted, that the density of supercritical CO_2 being injected into the reservoirs is 600 kg/m^3, and that the reservoirs can retain supercritical CO_2, the potential CO_2 storage capacity of Nova Scotia's depleted offshore oil/gas fields is approximately 38.5 $GtCO_2$. Given that Canada's total anthropogenic GHG emissions were 730 Mt CO_2e in 2019, this is a significant storage potential, equivalent to about 53 years' worth of Canada's 2019 anthropogenic GHG emissions.

Summary of Nova Scotia's Carbon Sinks

Nova Scotia has both carbon sinks and geological storage for potential CO_2 capture and storage. While other sinks do exist, such as carbon mineralization and seagrasses, they were not the focus of this report. Research to quantify these other sinks could be used to enhance the accuracy of the scenarios that will be provided in this. Of the three sinks examined, Nova Scotia's forests were found to be the largest sink by far, followed by the province's wetlands. Nova Scotia's croplands were estimated at present to be a source rather than a sink, though not a significant one in comparison to other emissions sources. Table 1 provides a summary of the 2019 baseline for Nova Scotia's carbon sinks.

Table 1: Nova Scotia's 2019 carbon sinks baseline summary

Sink	Potential
Forests	9.701 Mt CO_2/y absorbed
Cropland	0.145 Mt CO_2e/y released
Wetlands	1.911 Mt CO_2e/y absorbed

[13] Professor Grant Wach, Dalhousie University, personal communication, 23 June 23, 2021
[14] Ibid. 5 July 2021

The vulnerabilities, threats, and likelihoods of those threats must be taken into consideration when examining the net-zero scenarios. Policymakers need to understand the risks associated with the sinks when developing policy. It is essential that the quantities shown in Table 1 are kept up-to-date and accurate so that the state of the sinks can be measured and the net-zero goals can be adjusted accordingly.

2050 Net-zero scenarios

A jurisdiction's total emissions are the sum of its actual emissions from all emissions *sources* and any emissions *sinks* it may claim (typically a combination of changes in land use or forestry, or both, technologies for carbon capture and use or carbon capture and storage in geological structures, and emissions credits purchased in emissions trading systems):

$$Total\ Emissions = Emissions\ sources - Emissions\ sinks$$

When a jurisdiction reaches its net-zero target date, it will be in one of three states, determined by its total emissions:

$Total\ emissions = 0$: In this state, the jurisdiction's emissions sources are offset by its emissions sinks and the jurisdiction has achieved net-zero emissions.

$Total\ emissions < 0$: The jurisdiction is a net sink; after removing its own emissions, it still has "sink space" to remove additional emissions. The jurisdiction could, for example, use the space to attract industries from emissions intensive jurisdictions or sell the space as emissions credits to jurisdictions that are net emitters (see below). (As with the Covid-19 vaccines, there would always be the danger of jurisdictions hoarding emissions credits to force up the market price.)

$Total\ emissions > 0$: The jurisdiction's emissions sources exceed its sinks, making it a net source. If a jurisdiction in this state is required to achieve net zero, it should aim to maximize its decoupling and decarbonizing efforts before the net-zero target date. Since the total emissions exceed zero, it will be necessary to obtain emissions credits from jurisdictions that are net sinks. Such purchases will need to be made until the jurisdiction finds other, lower-cost sinks.

Achieving zero-emissions this way could be a costly exercise if there is a significant global demand for the carbon-removal process, as there may well be, given the number of organizations, regions, and countries pledging to attain net-zero by 2050.

In Nova Scotia's case, the province is committed to achieving net-zero emissions by 2050 .

This section considers three net-zero scenarios for the province in 2050 determined by the CO_2 flux strength: constant strength (the sink strength in 2050 is the same as in 2019), increasing strength (sink strength increases at different, evidence-based rates), and decreasing strength (the sink strengths decrease by 10% of the 2019 capacity per decade). (Emissions from Land-Use, Land-Use Change, and Forestry (LULUCF) are included in the greenhouse gas flux estimate for the province's croplands.)

Each scenario is described in terms of the total emissions sink strength (the sum of the forest, wetland, and cropland strength for 2050), the maximum permissible emissions in 2050 (the total sink strength), and the emissions reductions the province must make between 2019 and 2050 to reach the maximum permissible emissions.

Nova Scotia's 2019 emissions were 16.2 Mt CO_2e and are summarized by sector in Figure 1.

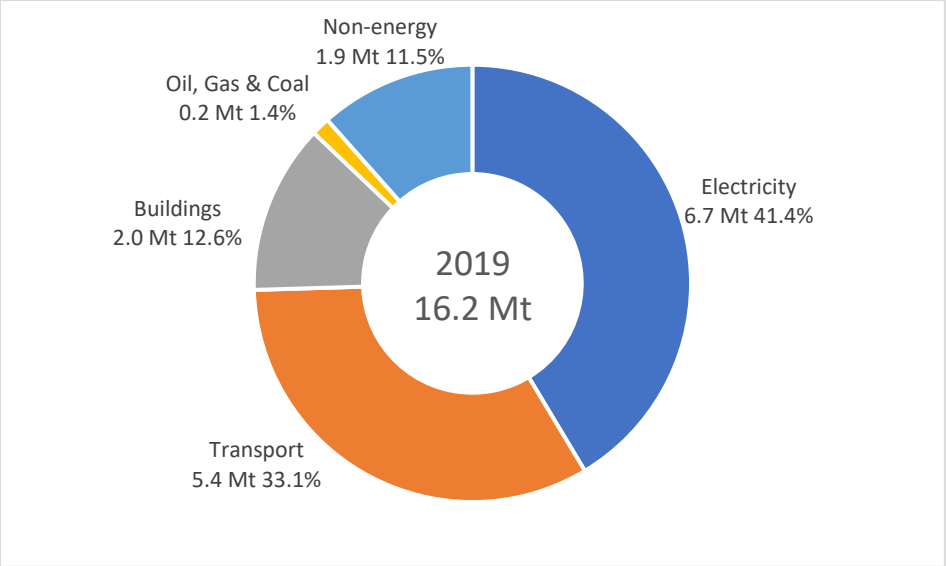

Figure 1: Nova Scotia 2019 GHG emissions by sector

Scenario 1: Constant Flux Strength

In the constant flux strength scenario between 2019 and 2050, the sink strength of Nova Scotia's forests and wetlands remains constant while croplands continue to act as a source. In this scenario (see Figure 2), the total sink strength in 2050 is 11.5 Mt CO_2e (sum of wetlands, croplands, and forest fluxes), to achieve net-zero, the province's emissions could not exceed 11.5 Mt CO_2e. The total anthropogenic emissions reduction from 2019 is 4.7 Mt CO_2e or approximately 29% below 2019 levels. This is higher than the province's 2030 emissions target of at least 53% below 2005 levels, or about 10.9 Mt CO_2e, suggesting the target would be easily achievable if the 2030 target was met.

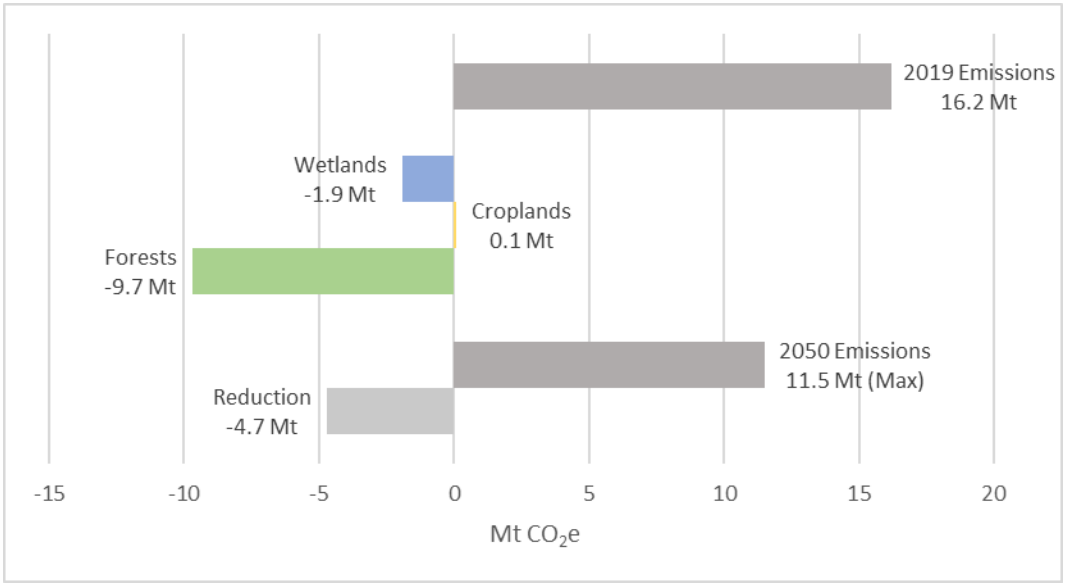

Figure 2: Emissions sinks and sources for the constant strength scenario

This scenario would probably be difficult to maintain, given the threats to and vulnerabilities of the sinks from climate change and anthropogenic activities.

Scenario 2: Increasing Flux Strength

In this scenario, sink flux strengths increase between 2019 and 2050, based on the following assumptions:

Forests: The forest sink CO_2 flux increases by 0.319 Mt CO_2 every five years (estimates based on data from Steenberg).[15]

Croplands: Improved cropland practices are fully implemented by 2050. The resulting changes in Nova Scotia's soil organic carbon are assumed to be the same as in the United States (0.36 t C/ha/y for cover crops, 0.14-0.18 t C/ha/y for improved crop rotations, and 0.33 t C/ha/y for no tilling). The increase in soil organic carbon is converted to CO_2 sequestered when calculating the CO_2 flux.

Wetlands: Net carbon sequestration rates remain constant and wetlands are restored so the sink increases by 4% of the baseline value every decade.

The increasing sinks scenario would be the most difficult scenario to achieve because the impact of the threats to and vulnerabilities of the biological sinks would have to be reduced while also increasing their carbon capacity.

By 2050, few emissions reductions would have to take place to meet the 2050 goal of net-zero emissions (see Figure 3). The maximum anthropogenic emissions permitted in 2050 is 13.9 Mt CO_2e, a reduction of about 14% from 2019. This value is significantly higher than what emissions should be reduced to in the 2030 target without sinks. An emissions reduction of about 2.3 Mt CO_2e is highly likely. The main issue with achieving this scenario is ensuring that the sinks' strengths increase while their threats and vulnerabilities decrease.

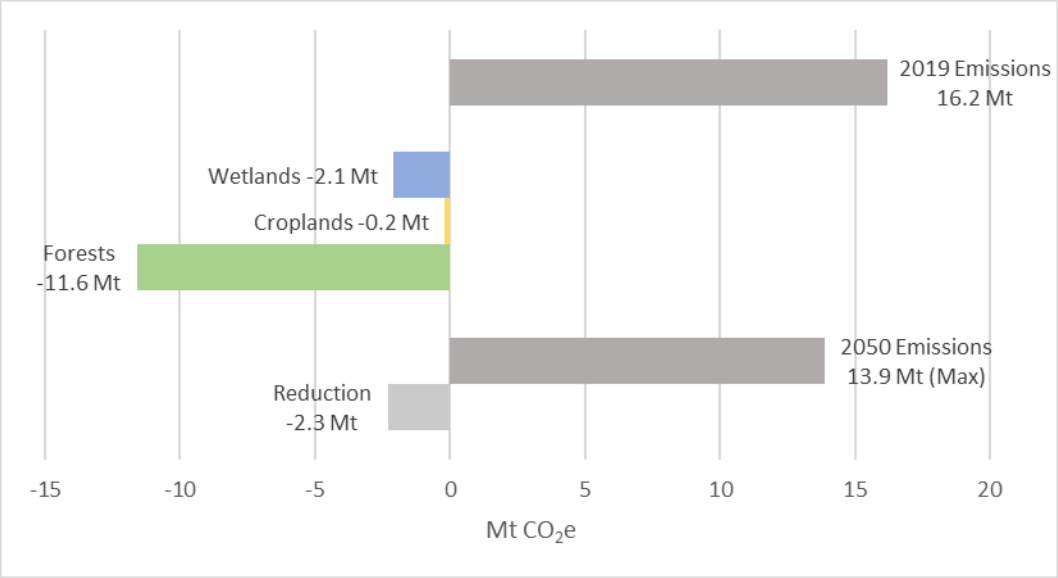

Figure 3: Emissions sinks and sources for the increasing strength scenario

Scenario 3: Decreasing Flux Strength

In this scenario, the flux strength of the sinks decreases. With the growing threat of climate-related events, this scenario may be considered more plausible than either of the two previous scenarios. Should the sink

[15] Dr. James Steenberg, Nova Scotia Department of Lands and Forestry, personal communication, July 2021

strengths decrease, the degree to which they decrease may be hard to predict; however, we assume the forest and wetland sink strengths decrease by 10% of the baseline value each decade, and for croplands, emissions increase by 10% of the baseline value each decade. As Figure 4 shows, the sinks remove a total of 7.9 Mt CO_2e; to achieve net-zero, Nova Scotians would need to reduce their emissions by 8.3 Mt CO_2e or 51% from 2019 levels.

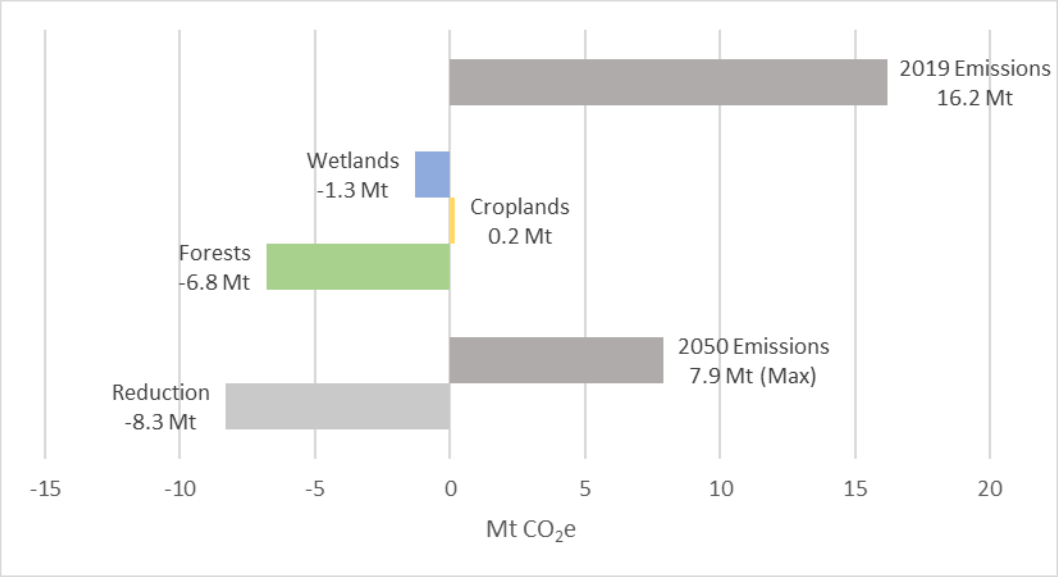

Figure 4: Emissions sinks and sources for the decreasing strength scenario

Summary

All the scenarios presented require some level of anthropogenic emissions reduction to achieve the 2050 net-zero emissions target. Table 2 details key information from the three net-zero emissions scenarios.

Table 2: Key results from the net-zero emissions scenarios to 2050

Sink Scenario	Projected total sink flux (Mt CO_2e)	Maximum allowable anthropogenic emissions (Mt CO_2e)	Change in anthropogenic emissions (2019-2050)	
			Mt CO_2e	**Percent**
Constant	-11.5	11.5	-4.8 Mt CO_2e	-29%
Increasing	-14.0	14.0	-2.3 Mt CO_2e	-14%
Decreasing	-7.9	7.9	-8.3 Mt CO_2e	-51%

The anthropogenic emissions reductions from 2019 levels range from 14% to 51%, and the projected total GHG flux of all sinks in 2050 range from approximately -7.9 Mt CO_2e to -14.0 Mt CO_2e. The projected total GHG flux of all carbon sinks in 2050 is always equal to the maximum anthropogenic emissions in 2050 for net-zero to be achieved.

Both maintaining and increasing sinks could be a major problem given all the vulnerabilities of sinks and the threats they face, such as the threats of fires and pests to the forests. Preventing sinks from decreasing in strength any further than the assumptions made for the decreasing sinks scenario could also be difficult depending on the impacts of the threats to and vulnerabilities of the sinks. It is important to note that, for the decreasing sinks scenario, the maximum anthropogenic emissions will continue to decline past 2050

if the sink strengths decline as well. This means that efforts to reduce emissions should not be given up once 2050 is reached.

If Nova Scotia is unable to achieve the emissions reduction necessary to meet the 2050 emissions target, it will have to either purchase negative emissions from another jurisdiction or construct direct air capture facilities. The cost of direct air capture ranges from 2019 values of roughly $90 to $900 USD per net tonne of CO_2 captured. For this report, it is assumed that these prices are both the cost of negative emissions (through purchasing or direct air capture) and the sale price of negative emissions.

If the province needs to remove one Mt CO_2e of emissions to reduce its emissions to net-zero, the cost would be between C$120 million and C$1.2 billion. Alternatively, if the province sold one Mt CO_2e of negative emissions, its revenue would be approximately $120 million to $1.2 billion in 2019 CAD. At the maximum cost of roughly $900 2019 USD per net tonne of CO_2 captured, the cost or revenue could be significant, especially if there is more than one Mt CO_2e that needs to be removed or can be sold. Work should be done to maintain and increase the biological sinks while also reducing anthropogenic emissions so that negative emissions can be sold, providing another revenue stream to the province.

Conclusion and Recommendations

By 2050, Nova Scotia intends to reach net-zero emissions "by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures". Since the province has yet to develop a plan to achieve either removals or offsetting measures, this report provides an estimated baseline of Nova Scotia's natural carbon sinks and its geological sequestration capacity and shows that Nova Scotia has significant carbon sinks and geological capacity in relation to its annual greenhouse gas (GHG) emissions.

The report explains the carbon capture potential of the province's sinks (forests, croplands, and wetlands) and the province's carbon storage capacity. It also examines possible threats to, and vulnerabilities of, the natural sinks, and considers potential ways of reducing the impact of the threats and vulnerabilities. Natural sinks, direct air capture, and carbon sequestration in geological formations are also described to give a better understanding of their concepts and carbon capture and sequestration potential.

Three different sink scenarios have been considered, developed on the assumption that between now and 2050, changes to the climate could affect the sinks. Using the province's 2019 emissions and estimated sinks as a baseline, three different sink scenarios (steady, increasing, and decreasing) were developed to determine the maximum allowable anthropogenic emissions to meet the 2050 net-zero target.

The minimum reduction from 2019 emissions levels to achieve net-zero depends on the changes to the province's sinks. If emissions levels remain steady at 11.5 Mt CO_2e, the province would need to reduce its emissions by about 4.8 Mt CO_2e or 29% from 2019 levels, slightly less than the province's 2030 emissions target requires. However, if the sinks are enhanced by various means each decade, by 2050 the sinks would remove about 14 Mt CO_2e and the Nova Scotians would only need to reduce their emissions by 2.3 Mt CO_2e or 14% from 2019 levels. In the case in which sinks flux strength is weakened by 10% a decade, Nova Scotians would need to reduce their emissions by 8.3 Mt CO_2e or 51% from 2019 levels. We should assume this last case is becoming increasingly likely.

If Nova Scotians are unable to achieve net-zero using emissions reduction programs or the sinks have insufficient capacity, the province would need to purchase negative emissions using direct air capture or emissions credits. The magnitude of the cost per Mt CO_2 was found to be about $120 million to $1.2 billion in 2019 CAD; however, if the province became a net-sink, it could sell the negative emissions.

Quite simply, the importance of the province's emissions sinks cannot be overstated if we are to achieve net-zero. The province must ensure that sinks remain protected or enhanced and geological sequestration be pursued. Net-zero must be maintained annually and in perpetuity.

To this end, we urge the province to adopt the following recommendations:

1. *Conduct a complete and accurate biannual assessment of the province's greenhouse gas (GHG) fluxes of the biological sinks (such as forests, croplands, wetlands, and seagrass meadows)*:
    - The assessment should be released as a publicly accessible state-of-the-sinks inventory report. Changes to the fluxes must be identified.
    - Each sink should be mapped and its GHG flux made available in a publicly available map. The associated data tables should be released with the map.
    - At a minimum, the following information should be supplied for each sink: location, area, annual GHG flux, and maximum annual GHG flux. This will provide better estimates of the maximum anthropogenic emissions for the 2030, 2050, and any interim targets. The data must be verifiable.

- Trends in the strength of the biological sinks should be monitored and appropriate action should be taken if the strengths decrease.

2. *Measure, report, and verify the carbon-related impacts of the threats to Nova Scotia's biological sinks and conduct an economic and carbon flux assessment of the potential solutions to reducing the threats and vulnerabilities of the sinks*:
   - Quantify the impacts on the carbon flux of any of the provincial biological sinks using known measurement, reporting, and verification techniques (MRV).
   - Conduct research into the potential solutions (including those presented in this report) to the threats and vulnerabilities faced by the sinks.
   - Evaluate the economic feasibility and changes to the carbon flux of potential methods to reduce the impact of the threats and vulnerabilities to biological sinks.
3. *Interim emissions reduction targets should be established*:
   - In addition to the legislated 2030 and 2050 targets, three interim emissions targets 2035, 2040, and 2045 will allow for changes to regulations to reduce the likelihood of overshooting net-zero.
   - These targets will provide emissions reduction reference points.
4. *Efforts should continually be made to reduce emissions beyond 2050*:
   - Net-negative global anthropogenic CO_2 emissions will need to be maintained annually and in perpetuity to prevent further increases in global temperature.
   - Reducing emissions so that net-negative emissions are achieved means environmental security if the sinks decrease in strength.
   - Maintaining net-negative emissions creates a potential revenue stream to the province and helps other jurisdictions reach their climate targets.
5. *Introduce tax incentives for carbon captured in natural sinks to promote the maintenance of our efforts to increase their carbon capture ability*:
   - Nova Scotia or the Government of Canada should provide tax incentives to managers of forests, croplands, wetlands, and seagrasses based on a per verified tonne of carbon captured. This incentive should be less than the annual cost-per-tonne for DAC; otherwise, it might be more financially reasonable to spend the government funds on DAC.
   - This will motivate land managers to manage their lands in a way to maintain or increase their carbon capture capacity.
6. *If the purchase of negative emissions is necessary, it must be sustainable*:
   - Achieving and maintaining negative emissions will require the province to budget for the purchase of emissions credits annually and in perpetuity.
7. *Since biological sinks are at risk from extreme climate events, the province must research and if possible, develop its geological storage capacity*:
   - The removal and long-term storage of existing atmospheric carbon using Direct Air Capture (DAC) is essential if global temperatures are to be maintained or, ideally, reduced by removing new and existing carbon from the atmosphere.
   - If properly managed, this could be a potential revenue stream for the province.

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Canada

An Analysis of the Greenhouse Gas Emissions Reduction Targets in Nova Scotia's Environmental Goals and Sustainable Prosperity Act of 2019

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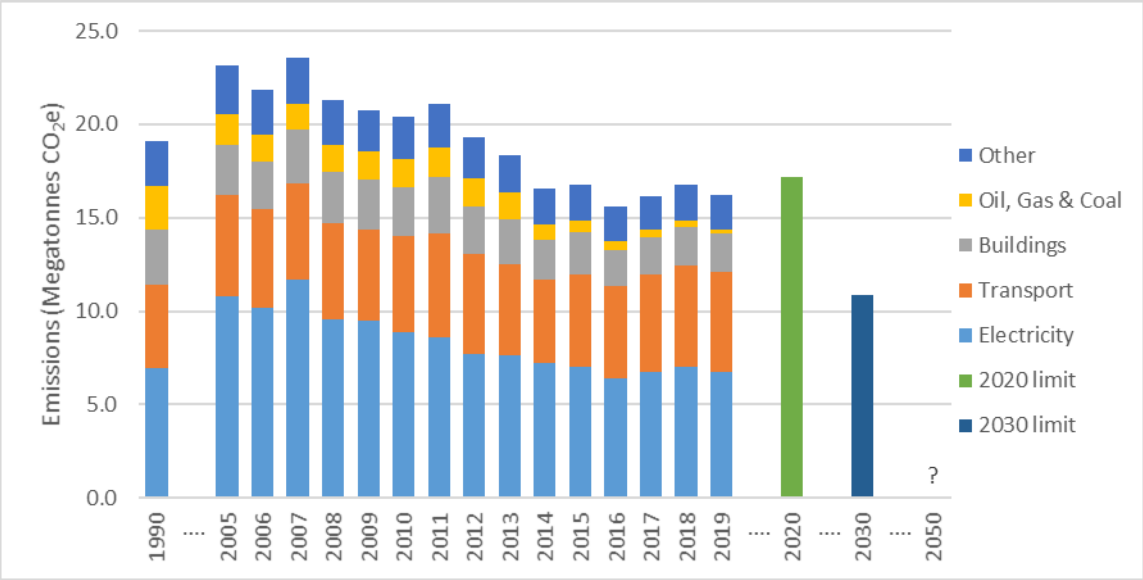
Contents

Overview

Nova Scotia, like all other Canadian provinces and territories, has emissions reduction targets for 2030 (as part of Canada's commitment at the Paris COP-21 meeting in 2015, Canada has pledged to achieve a 30% reduction by 2030) and a mid-century target of net-zero (in keeping with the growing body of evidence that to stop global average temperatures exceeding 1.5°C this century, the total of emissions sources and sinks must be zero by mid-century.)

Legislation in the early 2000s and subsequent amendments meant that the province's major emitter, Nova Scotia Power, was required to reduce its emissions from about 10 megatonnes (Mt) in 2010 to 4.5 Mt in 2030, while at the same time increasing its use of renewables from about 10% in 2010 to 40% in 2020. This, coupled with a weak economy, resulted in Nova Scotia achieving its Paris emissions reduction target of 30% below 2005 levels in the mid-2010s (subsequent revisions of the emissions data from Environment and Climate Change Canada show that Nova Scotia never reached the 30% mark).

In November 2019, Nova Scotia passed *An Act to Achieve Environmental Goals and Sustainable Prosperity* which, amongst other things, specified greenhouse gas reduction goals for 2020 (10% below 1990 emissions levels), 2030 (53% below 2005 emissions levels), and 2050 (net zero), as the following graphic from the report shows:



This report is an analysis of the Act, using existing data to consider the likelihood of the province having met its 2020 target, the challenges facing the province if it is to reduce its emissions by 53% by 2030, and the availability of emissions sinks in the province to offset the province's emissions in 2050.

2020

While we will not know Nova Scotia's actual emissions for 2020 until Environmental and Climate Change Canada National Inventory Report (NIR) in early 2022, the province has probably met its 2020 goal because of revisions to the province's NIR data for years leading up

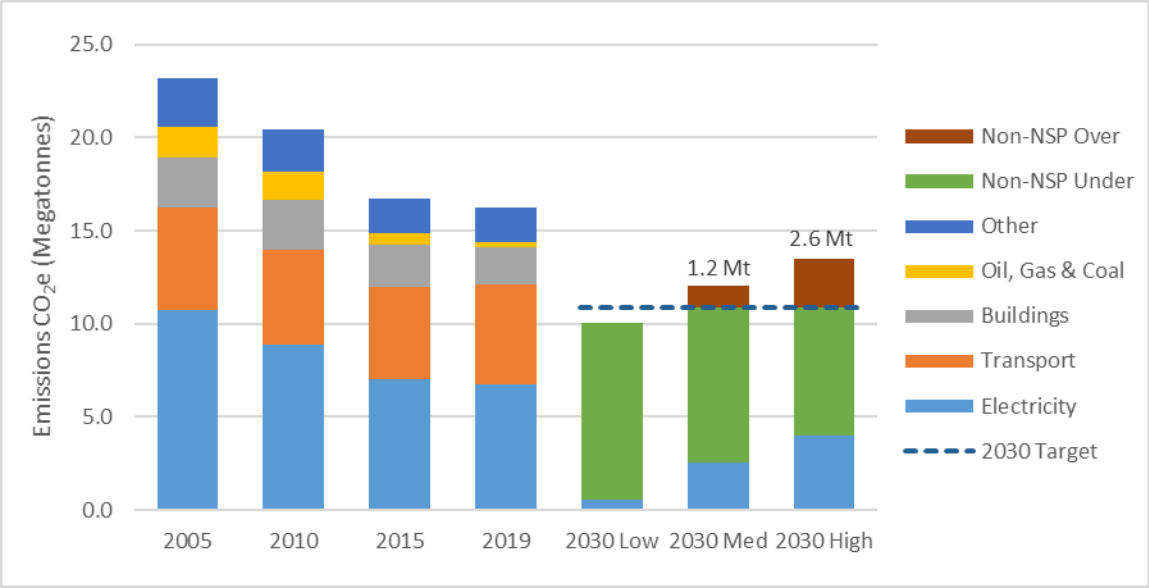
to and including 2017, pandemic-induced reductions in transportation, and reductions in Nova Scotia Power's emissions.

2030

Almost 90% of the province's emissions come from energy use, meaning that any reduction must focus on the three major emissions sources in the province: Electricity (6.7 Mt in 2019), Transportation (5.4 Mt in 2019), and Buildings (2 Mt in 2019).

The success of the 2030 goal hinges on the completion of the Atlantic Loop, an interconnection between the Maritime Provinces and Hydro Quebec. We use Nova Scotia Power's Integrated Resource Plan (IRP) to show that if the Atlantic Loop is completed by 2030, Nova Scotia Power will be able to phase out coal use and reduce its emissions to the point where none of the other emitting sources will need to reduce their emissions (in 2030).

However, if the Atlantic Loop is not completed by 2030, other sectors (notably Transportation and Buildings) will need to make reductions, the amount of which depends on the depths of Nova Scotia Power's reductions. In the worst case, Nova Scotia Power will reduce its emissions by 4 Mt (and still meet its 2030 emissions cap), but this will require the other sectors to reduce their emissions by about 1.2 Mt (in the Median case) and 2.6 Mt (in the High case), as the following figure from the report shows:



Since the province has focussed on Nova Scotia Power's emissions and to a lesser extent, Building emissions, it will probably be hard pressed to get sufficient electric trucks and electric vehicles on the road by 2030 to make up the difference. Reductions in Oil, Gas & Coal and Other (such as Agriculture, Forestry, Heavy Industry, and Waste) will undoubtedly help, but the focus will need to be on Transportation and Buildings.

It is absurd that the province's goal of a 53% reduction in emissions in less than 10 years is based on a policy of hope that the Atlantic Loop will come to fruition.

2050

Net-zero emissions means that the sum of a jurisdiction's emissions sources is equal to its emissions sinks. If there are more sinks than sources, the jurisdiction can, potentially, sell its excess sinks to other emitters. However, if the jurisdiction's sources exceed its sinks, the jurisdiction will need to find sinks.

The section examining the province's 2050 goal of net-zero does not consider the emissions sources in 2050, but rather the sinks. By knowing the sinks, we can develop policies to protect and enhance the sinks, as well as policies to target specific sectors to reduce their emissions to meet the sinks.

We show that the province has biological sinks (notably forests and wetlands) as well as geological capacity for storing carbon. The biological sinks capture carbon naturally, whereas the geological sinks require technologies such as Direct Air Capture (DAC) to remove the carbon from the air and store it in the geological format.

Without interim targets for the sources (to reduce emissions) and known emissions sinks (to know the upper limit on the sources), achieving the 2050 goal could prove costly for the province.

Recommendations

The report makes seven recommendations:

1. *Conduct a biannual inventory of the province's quantifiable and verifiable biological carbon sinks and continue to search for potential geological carbon storage sites that are quantifiable and verifiable.*
2. *Monitor the progress of the Atlantic Loop (for the 2030 goal).*
3. *Focus on electric vehicle infrastructure rather than subsidizing electric vehicles.*
4. *Introduce emissions targets for 2035, 2040, 2045, and 2050 (for the 2050 goal).*
5. *Adopt the recently modified federal carbon-pricing system or develop a provincial carbon-pricing system based on the federal backstop for emitters under 50,000 tonnes per year.*
6. *Apply an Output-Based Pricing System to industries emitting over 50,000 tonnes of CO2e per year.*
7. *Unallocated revenues collected from the carbon levy (emitters < 50,000 t) and the OBPS (emitters > 50,000 t) should fund programs to maintain and enhance the province's carbon sinks.*

Final thought

The *Environmental Goals and Sustainable Prosperity Act*, describes two goals, one for 2030 (emissions are to be at least 53% below the levels that were emitted in 2005) and the other for 2050 (emissions will be at net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures).

If these goals are not met, who is responsible?

An Analysis of the Greenhouse Gas Emissions Reduction Targets in Nova Scotia's Environmental Goals and Sustainable Prosperity Act of 2019

Larry Hughes, PhD Mark McCoy

26 July 2021

1 Introduction

In the first decade of the 2000s, most Canadian provinces and territories implemented emissions reduction legislation and regulations designed to meet or exceed Canada's Kyoto protocol commitments. Nova Scotia was no exception, in 2007, the provincial government enacted the *Environmental Goals and Sustainable Prosperity Act* with the objective of achieving "sustainable prosperity". This and subsequent Acts have focussed on capping greenhouse gas emissions from the province's electricity supplier, encouraging energy efficiency programs in buildings, and introducing a carbon pricing system.

In late 2019, the Government of Nova Scotia passed *An Act to Achieve Environmental Goals and Sustainable Prosperity*. The principal objective of the Act is to reduce the province's greenhouse gas emissions. To this end, subsection 7 of the Act states:

> *The Government's goals in relation to greenhouse gas emissions reductions are that greenhouse gas emissions in the Province are*
>
> *(a) by 2020, at least 10% below the levels that were emitted in 1990;*
>
> *(b) by 2030, at least 53% below the levels that were emitted in 2005; and*
>
> *(c) by 2050, at net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures.*

Figure 1 shows Nova Scotia's emissions stack by sector for 1990, 2005 through 2019, and the 2020 and 2030 reduction targets of 17.6 megatonnes (Mt) and 10.9 Mt, respectively (how these values were determined is shown in Table 1).[1, 2] The 2050 target, although net-zero, is shown as a '?' because we are interested in Nova Scotia's emissions sinks in 2050 as they can determine the limit on the province's emissions sources.

[1] 2020 emissions data for Canada's provinces and territories will not be available until early 2022.

[2] The economic sectors examined in this report fall into five groups, four of which are considered energy-related by the UNFCCC: electricity; transport; buildings (residential, and commercial and institutional); and energy-related extraction and production industries (oil and natural gas, refining, and coal mining), collectively referred to as Oil, Gas & Coal. The fifth group (referred to as Other) consists of economic sectors or activities that are responsible for non-energy related emissions, notably waste and industrial processes Light Manufacturing, Construction and Forest Resources; Agriculture; and Heavy Industry.

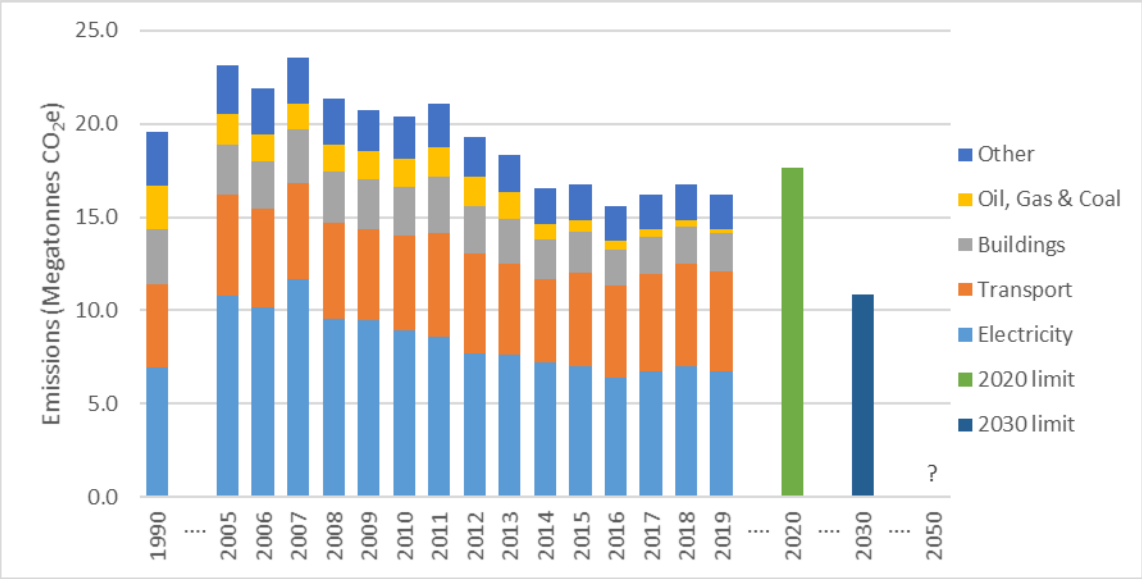


Figure 1: Sectoral emissions stacks for 1990, 2005-2019, and reduction targets for years 2020, 2030, and 2050 (data from ECCC)

Table 1: Base and target emissions for 2020 and 2030 (Emissions in megatonnes)[3]

Base		Target		
Year	**Emissions**	**Year**	**Requirement**	**Emissions**
1990	19.6	2020	10% below 1990 levels	17.6
2005	23.2	2030	53% below 2005 levels	10.9

The remainder of the report is organized as follows.

In the next section, an introduction to energy systems, emissions reduction, and emissions policies is presented. This section also examines the changes in Nova Scotia's emissions between 2005 and 2019 in terms of how the provincial economy decoupled from the province's energy system and how the energy system decarbonized during this period.

The third section briefly discusses the province's 2020 emissions target and explains how the decline in emissions that started in 2018 and the province's response to the Covid-19 pandemic in 2020 likely meant the target was met.[4]

In the fourth section, we examine how the 2030 target can be met. Since Nova Scotia Power is the province's largest emitter, we use three of the 27 scenarios presented in its Integrated Resource Plan (IRP) for the years 2021 to 2045, for its projected low, median, and high emissions scenarios for 2030. With this, we determine the total emissions reduction required by the remaining emitters (Transport; Buildings; Oil, Gas & Coal; and Other). For each of these sectors, we suggest ways in which they can reduce their emissions by 5%, 10%, and 15% from

[3] How the 53% was obtained is discussed in Section 4.1.

[4] Nova Scotia's actual emissions for 2020 will be released in Environmental and Climate Change Canada's National Inventory Report (NIR) in early 2022.

2019 levels. The section concludes with a detailed discussion of the likelihood of reaching these targets and what this could mean for the province's 2030 emissions target.

The fifth section starts with an introduction to net-zero and emissions sinks, explaining how sinks can determine a jurisdiction's maximum emissions sources and how exceeding net zero could well prove costly. This is followed by an examination of Nova Scotia's biological sinks and geological storage capacity for carbon, and the importance of understanding them.

The report concludes with a review of the analysis and a series of recommendations.

2 Background

In 2019, about 87.1% of the province's emissions were to meet energy demand and came from three sectors: Electricity, Transportation, and Buildings. To make any significant reduction in the province's emissions it will be necessary to target the province's energy system and its relationship to these sectors.

2.1 Energy systems

Nova Scotia, like all other jurisdictions, has an energy system responsible for meeting the activity requirements of its end-users. For most jurisdictions, such as Nova Scotia, a simplified version of its energy system can be discussed in terms of energy providers and energy services (see Figure 2):

- Energy providers are responsible for converting primary energy sources into secondary energy and then distributing the secondary energy to energy services used by end-users. The energy provider is to meet the energy demands of the energy services within limits specified by the government or corporate regulations. Depending on the primary energy source and the energy provider's conversion and distribution processes, the provider may be associated with emissions. Examples of energy providers include refineries converting crude oil into refined products such as gasoline, diesel, and heating fuel for distribution through a variety of networks; and electricity providers, which covert a variety of primary energy sources including coal, natural gas, uranium, and various renewable sources into electricity that is transmitted and distributed through electrical grids.
- Energy services use the secondary energy from the energy providers to meet the energy requirements of the end-user's activities. Some of the more common services are transportation, heating and cooling for industry and buildings, and services requiring electricity. Most services have some form of regulation to meet safety standards. As with energy providers, the use of some services results in emissions, for example, driving an automobile powered by an internal combustion engine, whereas others, such as electrical appliances, do not.

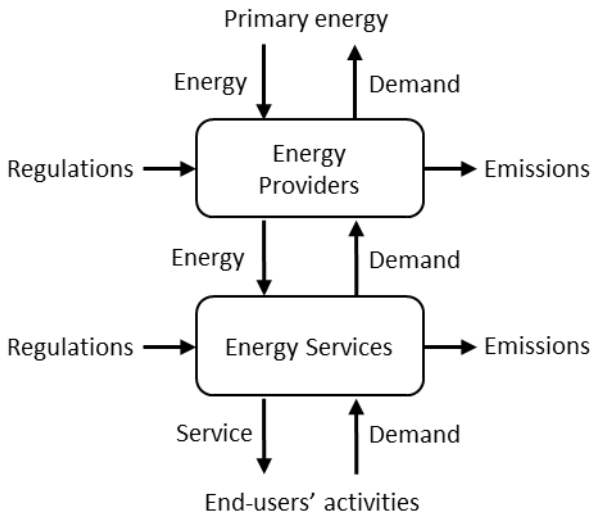


Figure 2: A simplified energy system

Since some emissions reduction measures are applicable to both energy providers and energy services, we refer to them as Processes and distinguish between them when necessary (see Figure 3). A Process takes $Energy_{IN}$ (e.g., primary or secondary energy) and converts it to meet the requirements of $Demand_{IN}$, either as $Energy_{OUT}$ (e.g., secondary energy) or a service (such as transportation). Depending on the Process there can be emissions ($Environment_{OUT}$), for example, from a natural gas plant generating electricity or an automobile powered by an internal combustion engine.

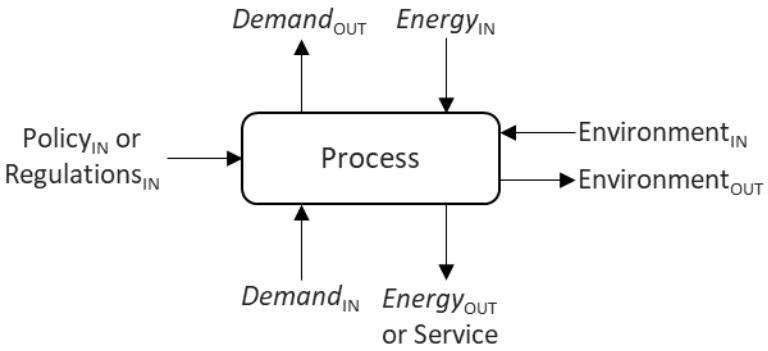


Figure 3: A process and its flows

2.2 Emissions reduction

Many jurisdictions have an emissions reduction target, typically a percentage below the emissions in a starting year to be achieved by a certain future date. Progress is measured by comparing the annual change in emissions relative to the starting year.

Changes in energy emissions are a function of:

- The volume of energy consumed to meet the energy requirements of an activity in the jurisdiction. If the activity and energy demand are greater than their starting year levels, the jurisdiction is in the *coupling state*; however, if the activity is greater than its starting year

level and demand is less than its starting year level, the jurisdiction is in the *decoupling state*. Jurisdictions often have policies intended to decouple the activity from its energy demand by increasing the activity and lowering its energy demand.

- The emissions associated with the energy consumed. The jurisdiction is said to be in the *carbonizing state* if both the emissions and energy consumed are increasing relative to their starting year values. If emissions are below the starting year value and the rate of emissions is declining while the energy consumption rate is increasing, then the jurisdiction is in the *decarbonizing state*. This state also applies in the case that energy consumption is declining, but emissions are declining at a faster rate. Many jurisdictions have decarbonizing policies targeting emissions-intensive processes so the same activity can be achieved by a low- or zero-emission process, such as replacing liquid-fueled internal combustion engines with electric-powered motors in the transportation sector.

2.2.1 Emissions reduction policies

Emissions reduction policies can target an energy service or energy provider, or both. They can be described in terms of one of the following three categories of energy policy.

Reduction policies

Reduction policies refer to measures that reduce energy demand without changing the Process or the energy it consumes ($Energy_{IN}$). These policies normally target end-users so that $Demand_{IN}$ declines and can include financial incentives to reduce energy demand (such as building retrofits), and pricing mechanisms to discourage energy use (such as carbon-pricing).

The Process can also be targeted in an energy reduction policy, typically to return it as closely as possible to its original efficiency to reduce its $Demand_{OUT}$ and possibly emissions; for example, tuning an automobile or heating furnace.

Pricing mechanisms can encourage a decline in $Demand_{IN}$ on the part of the end-user (e.g., driving less, switching off unused lights, or raising the setpoint on an air conditioner); however, such mechanisms can be detrimental to low-income or disadvantaged groups, or inconsequential to high-income earners.

Reduction policies can weaken coupling by reducing $Demand_{OUT}$; however, a reduction policy need not lead to a reduction in emissions. For example, if the $Energy_{IN}$ used by an energy service comes from an energy provider using zero-emissions sources, any reduction in $Demand_{IN}$ might lead to a decoupling, but it will not reduce emissions.

Replacement policies

Replacement policies are measures that either:

- Change the energy supply ($Energy_{IN}$) but not the Process meeting the demand (i.e., the energy provider or energy service).

  Examples include replacing the coal in a thermal generating station with a mixture of coal and biomass, and replacing petroleum products used for transportation with a petroleum-

ethanol mix. Such measures are usually intended to weaken the carbonizing state; however, there is often disagreement as to the degree of this reduction [ref].

- Use the same energy supply ($Energy_{IN}$) but change the Process that consumes it. These replacements typically refer to an end-use energy service rather than an energy provider.

  Examples include replacing an internal combustion vehicle (ICE) with a hybrid electric vehicle (HEV), replacing baseboard heating with a heat-pump, or replacing an incandescent bulb with a light-emitting diode (LED). These measures are intended to lead to a reduction in energy demand (i.e., weakening the coupling state) and depending on the energy used, weakening the carbonizing state.

Restructuring policies

Restructuring policies fall into one of two categories:

- In the first, existing demand is met by replacing *both* the Process and $Energy_{IN}$. Examples include the shuttering of coal plants in favour of natural gas and renewables, a consumer purchasing a plug-in electric vehicle to replace an existing conventional petroleum vehicle, and replacing an oil furnace with a heat pump.
- The second involves adding a new Process and a new $Energy_{IN}$ to the system to meet new demand that cannot be met by the existing energy system. For example, an electricity supplier adding new natural gas combined cycle turbines to meet new demand or someone opting to purchase an electric vehicle rather than a conventional (ICE) vehicle.

Restructuring can change the decarbonizing state, potentially leading to a decarbonization of an energy provider. For example, replacing a fleet of coal-fired thermal stations with a combination of hydroelectric, nuclear, and new renewables [ref]. However, restructuring can also put the jurisdiction in the carbonization state if, for example, coal-fired thermal stations are brought online to meet rising demand for electricity (Li, Gallagher and Mauzerall 2020).

Unless the restructuring results in changes to the end users' activities, such as an increase in the cost of using the service, there is little incentive for the end user to reduce energy demand. If the restructuring is intended to meet new demand, demand could increase, strengthening the coupling state.

2.3 Nova Scotia's emissions from 2005 to 2019

Nova Scotia's emissions have remained below 23.2 Mt since 2005. Much of this can be attributed to the decoupling of various sectors of the economy from the province's energy system; for example, declines in energy demand in the industrial and transportation sectors. In addition, there was success in decarbonizing parts of Nova Scotia Power's generation.

Although Nova Scotia's emissions declined by 6.9 Mt between 2005 and 2019 (see emissions stacks in Figure 4), the energy related grouping (Electricity, Transport, Buildings, and Oil, Gas & Coal) was responsible for 88.5% of the province's emissions, while Other emitters remained at slightly over 11%. The largest declines over this period were in Electricity (-4.1 Mt), because of legislation targeting Nova Scotia Power and the decline in electricity demand by major industrial users; and Oil, Gas & Coal (-1.4 Mt), the result of shuttering the only refinery in the

province and the permanent production shutdown of the province's two offshore natural gas projects (Sable and Deep Panuke).

Legislation creating a provincial organization to decouple and decarbonize Buildings resulted in emissions declining by 0.66 Mt, while Other also experienced a decline of 0.73 Mt, largely due to declines in non-energy activities (notably agriculture and manufacturing). Transport emissions were essentially unchanged.

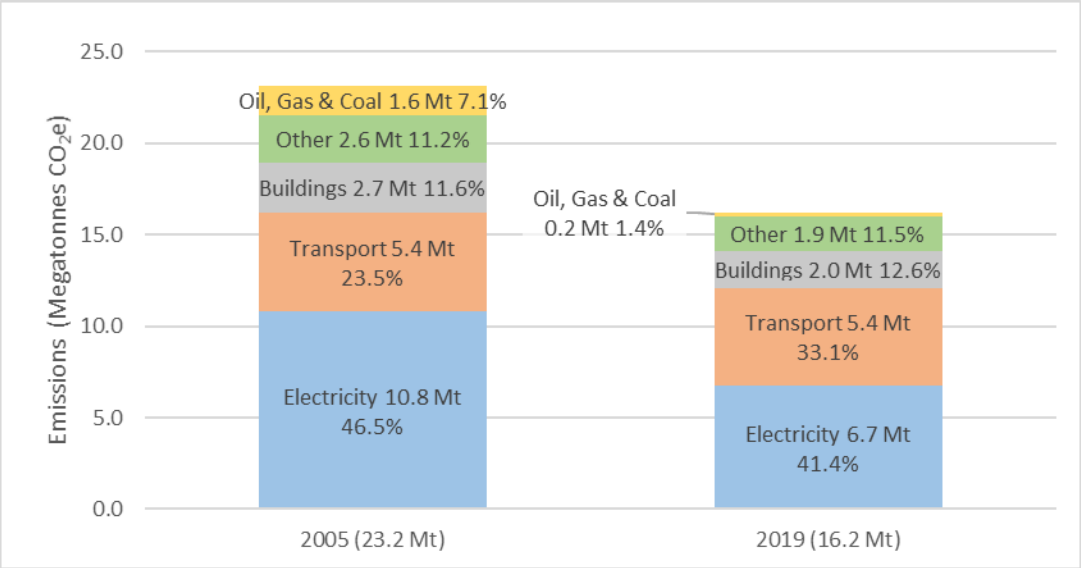


Figure 4: Nova Scotia's emitters by economic sector in 2005 and 2019

Figure 5 shows the evolution of the province's emissions states between 2005 to 2019; by 2019:

- GDP had grown by 16.9% (ΔGDP) and its trend (GDP') was positive.
- Energy demand was about 20% lower than it was in 2005 (ΔEUD) and the trend (PES') was negative.
- The province's total emissions fell by 29.9% (ΔCO_2), and the trend (CO_2') was negative.

The province's economic growth, represented by its GDP, was the third lowest in the country, after Newfoundland and Labrador and New Brunswick. The province's weak economic growth and a corresponding decline in energy demand, resulted in strong decoupling.

Emissions declined at a slightly greater rate than decline in energy demand, in part because of the restructuring of Nova Scotia Power in response to legislation imposing an emissions cap and a requirement to increase its use of renewables. Consequentially, the province was in the moderate decarbonizing state.

The increase in emissions between 2016 and 2018, and the subsequent decline in 2019 reflects changes in transportation energy demand.

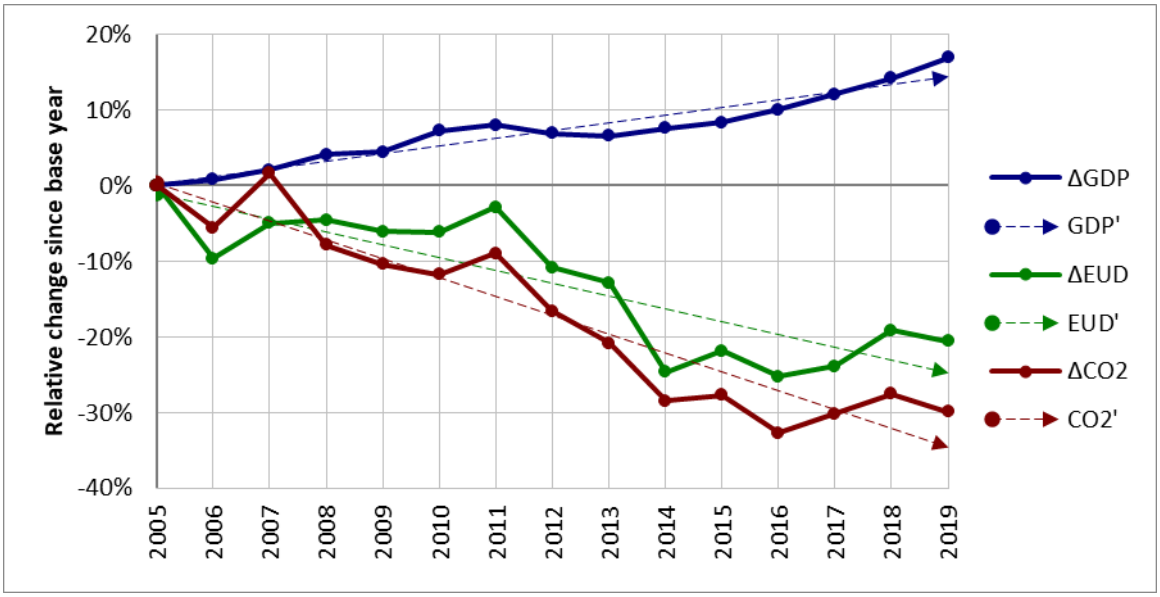


Figure 5: Nova Scotia (Strong decoupling and moderate decarbonizing)

3 2020: 10% under 1990 emissions levels

In 2007, the Government of Nova Scotia passed legislation to reduce its emissions by 10% from 1990 levels by 2020, from 19.6 Mt to 17.6 Mt. This was reaffirmed in province's 2019 Environmental Goals and Sustainable Prosperity Act.

The province's emissions have consistently remained below 17.6 Mt since 2014. In 2019, the province's emissions were 16.2 Mt or 17.2% below 1990 levels, tied with 2017 for the second lowest since 2005 (the lowest being 2016). For the province's emissions to exceed the 10% target, they would need to rise by 1.4 Mt over 2019 levels in 2020.

This is unlikely for several reasons:

- The province's Renewable Electricity Regulations require Nova Scotia Power to achieve a ratio of total renewables production to total sales (demand) of 25% for calendar years 2015 through 2019. Starting in calendar year 2020, this was to increase to 40%; however, because of Covid-19 related delays to the Muskrat Falls project, this target cannot be met. In response, the provincial government has relaxed the regulations and now requires Nova Scotia Power to have an average ratio of 40% between 2020 and 2022.[5]

  As Table 2 shows, between 2019 and 2020, Nova Scotia Power's sales of electricity declined by 0.44 TWh from 2019 levels, a result of the impact of the Covid-19 pandemic on the province's economy. This, plus the need to reduce emissions to meet the province's 2020-2022 ratio, resulted in the company reducing its reliance on coal and purchased power, and increasing its use of natural gas, oil, and petroleum coke. Despite the loss of 0.26 TWh of production from renewables, Nova Scotia Power's emissions fell by an estimated 0.29 Mt.

Table 2: Nova Scotia Power's emissions for 2020[6]

Fuel	2019			2020	
	Production TWh	**Emissions Mt**	**Intensity Mt/TWh**	**Production TWh**	**Emissions Mt *est.***
Coal	4.95	4.75	0.960	4.34	4.17*e*
Natural gas	1.44	0.78	0.539	1.87	1.01e
Oil and petcoke	0.91	1.02	1.124	0.97	1.09e
Purchased power	0.79	0.03	0.040	0.66	0.03e
Renewables	3.18	0.0		2.92	0.0
Totals	11.26	6.58		10.76	6.29e
Sales (Demand)	*10.47*			*10.03*	

[5] This should be achievable by, for example, Nova Scotia Power increasing the number of "blocks" of electricity it purchases from the Muskrat Falls project when finally commissioned.

[6] Nova Scotia Power was approached in late June with a request to update its Air Emission webpage, which as of 25 July 2021 had not been done, hence the use of estimates rather than actual values.

- The Canada Energy Regulator estimated the energy content of liquid fuels sold in Nova Scotia during 2020 declined from 2019, as Table 3 shows (the actual sales of liquid fuels will not be available from Statistics Canada until 2022). The pandemic is assumed to have affected the major energy consuming sectors differently: Commercial, Industrial, and Transportation sectors experienced a decline in emissions; whereas Residential increased. From these estimates we can assume that emissions from liquid fuels declined.

Table 3: Estimated energy content (petajoules) of liquid fuels sold in Nova Scotia

Sector	2019	2020
Commercial	4.49	3.90
Industrial	10.57	9.88
Residential	16.74	17.45
Transportation	79.25	70.69
Total	111.31	102.15

The available data would suggest that Nova Scotia met its 2020 emissions target of 10% below 1990 levels. However, had the province not achieved this target, there were no penalties associated with missing it.

4 2030: 53% under 2005 emissions levels

Nova Scotia's Environmental Goals and Sustainable Prosperity Act of 2019 was enacted before Covid-19 affected the province in 2020. The 2030 emissions target specified by the Act requires the province's emissions to decline by 53% of its 2005 emissions levels, from 23.2 megatonnes to 10.9 megatonnes or 12.3 megatonnes. However, reaching the target from its 2019 level of 16.2 megatonnes (the most recent data from ECCC) will require the province's emissions to decline by 5.3 megatonnes.

4.1 Why 53%?

Nova Scotia's 2030 target of "at least 53%" below its 2005 level of emissions exceeds Canada's Paris pledge of 30%. The choice of 53% was based on the province's desire to meet the emissions targets specified by the IPCC to limit global temperature increases to no more than 1.5°C this century. To achieve this, the IPCC recommended that global anthropogenic emissions decline about 45% from 2010 emissions levels by 2030 and reach net-zero by 2050.

The steps used to obtain Nova Scotia's 2030 target are summarized in Table 4 (column Unrounded): a) the province's emissions for 2010 were about 20.4 Mt; b) 45% of the 2010 emissions is 9.2 Mt; c) the 45% reduction is subtracted from the 2010 emissions level to give the 2030 target of 11.2 Mt; d) the province's emissions in 2005 were about 23.2 Mt; e) the required reduction (2005 to 2030) is 11.9 Mt; and f) in percentage terms, the province needs to reduce its emissions by 51.5%.

However, a series of assumptions were made by the Department of the Environment, the first being to round the target down from 11.2 Mt to 11 Mt (step c in column Rounded), giving a reduction of 12.1 Mt or 52.5%. The 52.5% was then rounded up to 53%, making the target "at least 53%" below the 2005 emissions level.

By rounding the 2030 target down from 11.2 Mt to 11 Mt and the percentage up from 52.5% to 53%, the 2030 target is 53% below the 2005 level (23.2 Mt) or 10.9 Mt.

Table 4: Determining the 2030 target

	Unrounded	Rounded
a) Emissions in 2010	20.4	
b) 45% reduction of (a)	9.2	
c) 2030 target (a)-(b)	11.2	11
d) Emissions in 2005	23.2	23.2
e) Required reduction from 2005 to 2030 (d)-(c)	11.9	12.1
f) Fraction: (e)/(d)	51.5%	52.5%

While the choice and reasoning for the choice is laudable, there appears to have been little thought given to whether or how this target could be achieved. The remainder of this section describes different changes to the provincial energy system needed to meet the 2030 target.

4.2 Nova Scotia Power's 2030 emissions scenarios

Legislation requires that by 2030, Nova Scotia Power's emission must not exceed 4.5 megatonnes and 40% of the electricity it sells in the province comes from renewables sources.

In late summer 2020, Nova Scotia Power released its Integrated Resource Plan for 2021 to 2045. The IRP lists 27 scenarios of possible generation sources, capacity, generation, production, and emissions. The emissions associated with each of the 2030 scenarios are shown in Figure 6, ranked from the lowest emissions (left) to the highest (right).

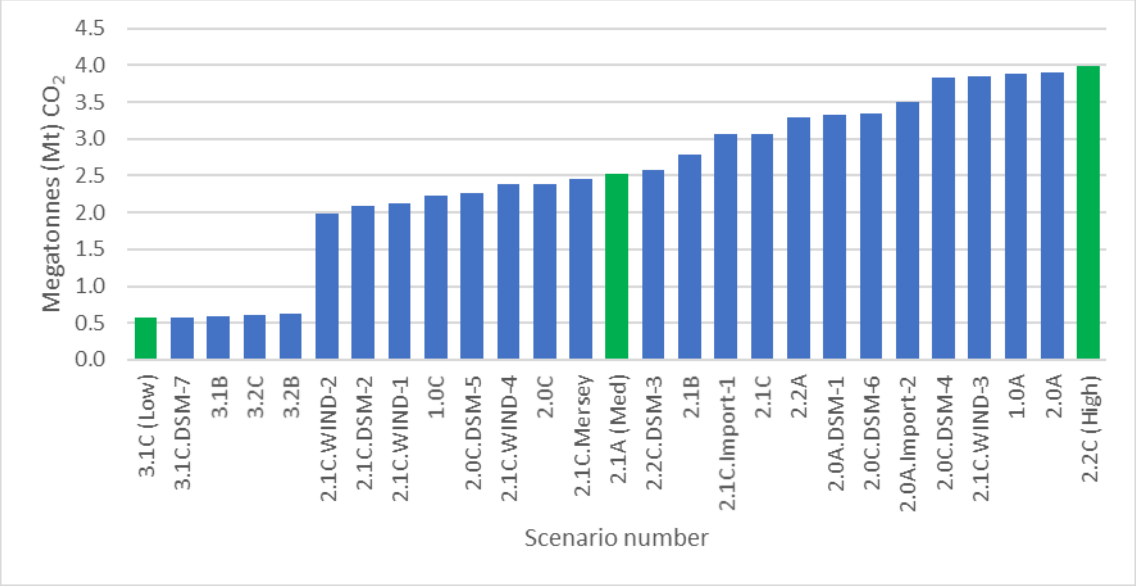


Figure 6: Nova Scotia Power's scenario emissions for 2030 (data from Nova Scotia Power)

For the purposes of this report, we consider three of Nova Scotia Power's scenarios for 2030:

3.1C (Lowest emissions): In this scenario, referred to as Accelerated Net Zero 2045, Nova Scotia Power's emissions decline from 6.7 Mt in 2019 to 0.57 Mt in 2030, removing about 6.1 Mt of emissions. By 2030, about 50% of the province's electricity will be supplied from renewable sources within the province (36% from wind) and coal will be phased out entirely. Complete regional integration between Quebec, New Brunswick, and Newfoundland and Labrador (using the existing Maritime Link) is required since 42% of the electricity is imported. Although not explicitly mentioned, the underlying assumption in this scenario is that the Atlantic Loop will be completed by 2030, giving Quebec access to the Maritime Provinces and, more importantly for Hydro Quebec, New England.

Electricity demand in 2030 is 11.5 TWh.

2.1A (Median emissions): This scenario sees Nova Scotia Power's emissions fall to 2.5 Mt, a decline of about 4.2 Mt from 2019 levels. As with 3.1C, in 2030 almost half of the electricity available in the province comes from provincial renewable sources (34% from wind), with the remainder evenly split between carbon-intensive sources (coal contributes 17%) and imports.

Electricity demand in 2030 is 11.4 TWh.

2.2C (Highest emissions): In the high-emissions scenario, Nova Scotia Power reduces its emissions by 2.7 Mt, from 6.7 Mt to 4.0 Mt of CO_2e in 2030 (this is 0.5 Mt below the federal-provincial emissions cap for Nova Scotia Power). A total of 40% of the production comes from emissions-intensive sources (25% still comes from coal); of the remainder, 31% comes from in-province sources (with wind contributing about 20%). 29% is imported.

Despite assuming maximum Demand Side Management (DSM) adoption, total demand is 11.8 TWh.

4.3 The impact of Nova Scotia Power on the 2030 target

In 2019, Nova Scotia Power was the province's single largest emissions source. Before considering the province's remaining emissions sources, it is necessary to understand the impact Nova Scotia Power will have on the province's 53% reduction target.

In 2019, Nova Scotia Power's emissions totalled 6.7 Mt and emissions from sources other than Nova Scotia Power totalled 9.5 Mt, for a total of 16.2 Mt. If the province is to meet its 2030 target of 10.9 Mt, emissions need to decline by 5.3 Mt from 2019 to 2030.

Figure 7 shows the province's emissions by sector for selected years between 2005 and 2019. The dashed line is the 2030 target level of 10.9 Mt.

The rightmost three bars show Nova Scotia Power's emissions for its Low, Median, and High emissions in 2030 (blue, at the bottom of the stack) and the 2019 total emissions from sources other than Nova Scotia Power (i.e., Transport, Buildings, Oil & Gas, and Other).

The non-Nova Scotia Power emissions are stacked on top of Nova Scotia Power's emissions (shown in green and red, indicating the total volume below and above the 2030 target, respectively). The red bands are the volume of reductions required by sources other than Nova Scotia Power in 2030:

2030 Low: Emissions from Nova Scotia Power (0.57 Mt) and non-Nova Scotia Power sources (9.51 Mt) total about 10.1 Mt, meaning in this scenario, emissions from sources other than Nova Scotia Power could *increase* their emissions by almost 0.8 Mt and the province would still achieve its 2030 target.

2030 Median: In this scenario, the province's total emissions in 2030 would be about 12 Mt (2.53 Mt from Nova-Scotia Power and 9.51 Mt from sources other than Nova Scotia Power). In this case, emissions from sources other than Nova Scotia Power would need to decrease their emissions by about 1.2 Mt to meet the 10.9 Mt target.

2030 High: In the third scenario, Nova Scotia Power's emissions are 4 Mt, which would put the province's emissions at 13.5 Mt, requiring a reduction of 2.6 Mt from sources other than Nova Scotia Power to meet the 2030 target.[7]

[7] If Nova Scotia Power achieves its 2030 High scenario target of 4 Mt, it will have met the 4.5 Mt CO2e emissions cap required by the province.

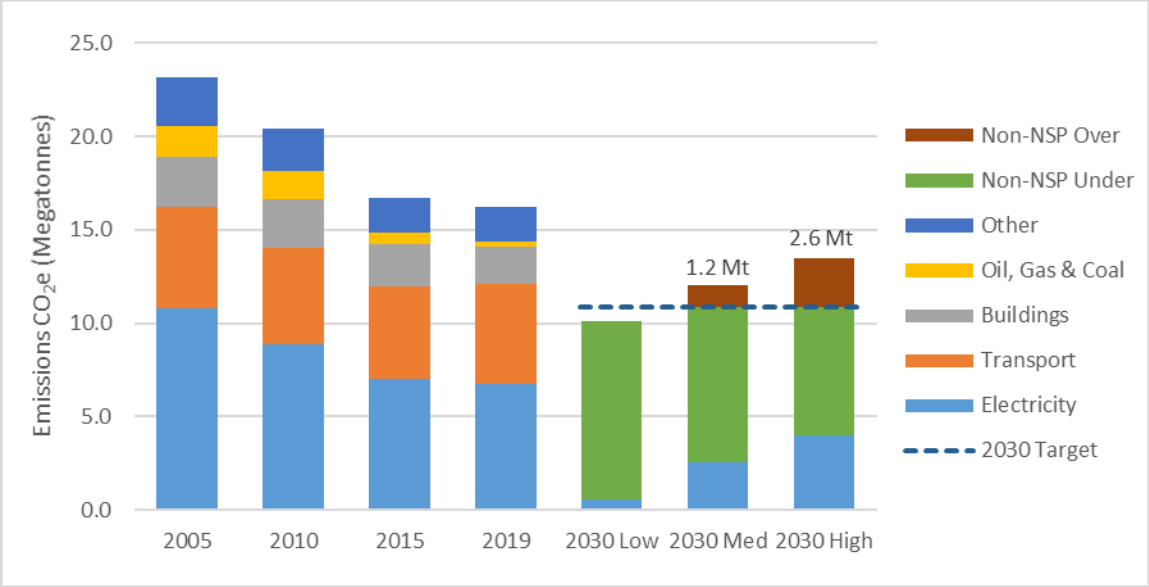


Figure 7: Nova Scotia's emissions for major emitters for selected years and Nova Scotia Power's importance to the 2030 target

4.4 Emissions from sources other than Nova Scotia Power

In this section we examine emissions from sources other than Nova Scotia Power: Transport; Buildings; Oil, Gas & Coal; and Other. In each case, we consider the effect of no reduction (Business as Usual), and three reduction scenarios: 5, 10, and 15 percent.

We do not consider the impact on Nova Scotia Power's emissions of any decoupling or decarbonizing action that takes place by one of these sources, regardless of whether it changes the volume of electricity produced.

4.4.1 Transportation

After electricity, transportation is the second largest source of emissions in the province. Transportation refers to all possible transportation modes used in the province: road, marine, rail, air, and off-road.[8] Within each mode there are several subcategories; for example, road includes light-duty gasoline trucks (passenger and freight) and vehicles (cars), off-road vehicles, and motorcycles. The UNFCCC reporting requirements state that transportation emissions are the result of the combustion of different fuels (including gasoline, diesel, aviation fuels, and liquefied petroleum gases (LPG)).

Analysis

Between 2005 and 2019, Nova Scotia's total transportation emissions declined from a high of 5.74 megatonnes in 2005 to a low of 4.53 megatonnes in 2014 then climbed to 5.70 megatonnes in 2018, and dropped to 5.58 megatonnes in 2019. The rebound from 2014 is due

[8] According to the UNFCCC's Common Reporting Format for emissions, "… emissions from international aviation and marine bunkers … should not be included in the national total emissions from the energy sector".

almost entirely to the growth in the use of light duty gasoline trucks. The change in emissions by type of transportation (vehicle category or mode) are shown in Figure 8.[9]

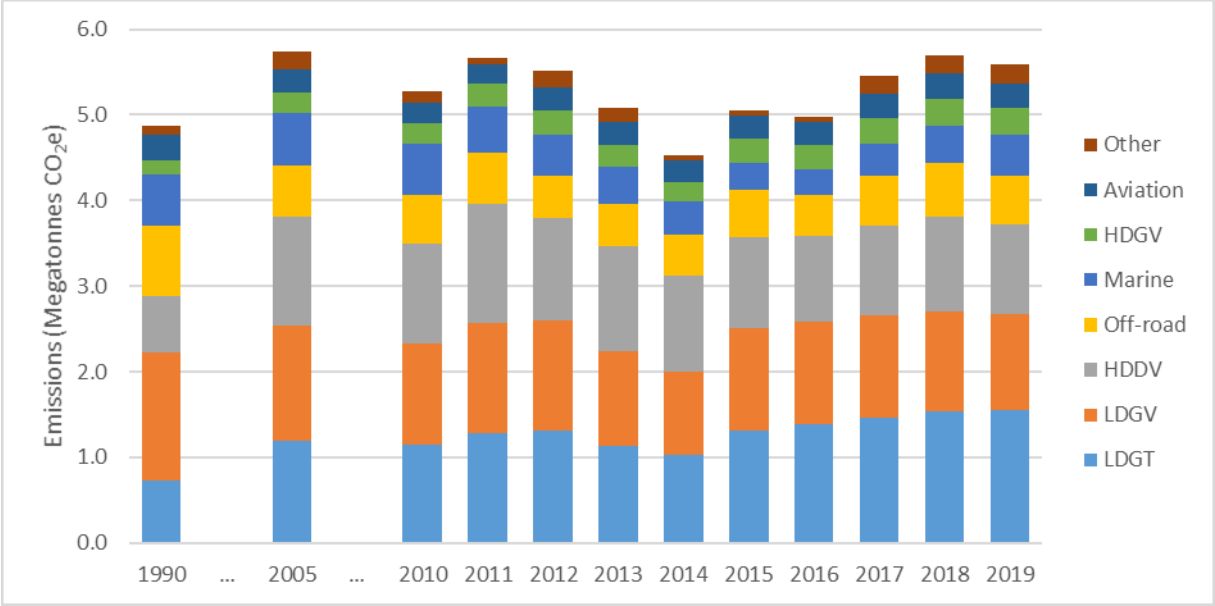


Figure 8: Transportation emissions by vehicle/mode for selected years
(Other includes railways, LDDV, LDDT, motorcycles, pipelines, and PNG vehicles)

During this period, the contribution of road emissions increased marginally as a percentage of overall transportation emissions, from 71.5% of emissions in 2005 to 73.3% in 2019. The causes of the changes in road transport emissions are summarized in Table 5.

Table 5: Change in road transport emissions between 2005 and 2019

Vehicle	Category	Emissions (Mt)			Percent change
		2005	2019	Change	
Light-Duty Gasoline Trucks	LDGT	1.19	1.56	0.36	30.5%
Light-Duty Gasoline Vehicles	LDGV	1.35	1.12	-0.23	-17.1%
Heavy-Duty Diesel Vehicles	HDDV	1.26	1.05	-0.22	-17.0%
Heavy-Duty Gasoline Vehicles	HDGV	0.24	0.31	0.07	30.2%
Light-Duty Diesel Vehicles	LDDV	0.04	0.02	-0.02	-41.3%
Light-Duty Diesel Trucks	LDDT	0.01	0.02	0.02	175.4%
Motorcycles	Motorcycles	0.01	0.01	0.01	116.2%
	Totals	4.10	4.09		

[9] Categories: LDGT: Light-Duty Gasoline Truck (both passenger and freight); LDGV: Light-Duty Gasoline Vehicle (cars); HDDV: Heavy Duty Diesel Vehicle (medium and heavy trucks); HDGV: Heavy Duty Gasoline Vehicles; and Other: railways, LDDV (Light-Duty Diesel Vehicles), LDDT (Light-Duty Diesel Trucks), motorcycles, pipelines, and PNG (Pressurized Natural Gas) vehicles.

Restructuring transportation: Road vehicle emissions reduction to 2030

Restructuring transportation requires existing vehicles using internal combustion engines (ICEs) and gasoline be replaced with vehicles using other energy sources (typically electricity in electric vehicles and electric trucks; although a modal shift restructuring, for example, to an electric bus, bicycle, or even walking).

Unlike electricity (above) and buildings (below), the province has no legislation in place to explicitly lower vehicular emissions. Other than fuel taxes (both provincial and federal) and a federally approved provincial carbon-pricing system which is far less onerous than those found in most of the other provinces, the Nova Scotia government has few tools at its disposal other than federal funds for electric vehicle subsidies.

The effects of the Covid-19 pandemic are expected to have a multi-year impact on Canada's economy, including transportation. There is no reason to think that Nova Scotia will be any different. According to federal projections, overall transportation emissions are expected to decline by 17% between 2018 and 2020, and a further 2% between 2021 and 2030, although as Table 3 shows Nova Scotia's transportation energy demand only declined by an estimated 10% because of the pandemic. Global emissions, including those from transportation, are expected to rebound in 2021.

The two transport categories garnering the most interest in terms of their emissions are light duty gasoline trucks (LDGT) and light duty gasoline vehicles (LDGV). Many jurisdictions and automobile manufacturers are in the process of restructuring their transportation systems to support electric and hydrogen vehicles rather than liquid fuels or internal combustion engines.

Light Duty Gasoline Trucks

ECCC's emissions data does not distinguish between Passenger Light Duty Trucks (commonly referred to as SUVs) and Freight Light Duty Trucks, classifying them as "Light Duty Trucks". Although there are minor differences between the two in terms of fuel consumption, we examine both separately using data from NRCan.

Although average growth over the past decade in light trucks has averaged over 4%, we assume a growth rate between 2019 and 2030 of 2%. The average distance driven between 2015 and 2018 was 21,000 km, which we assume to be the average distance driven each year between 2019 and 2030. Finally, we assume an increase in fuel efficiency of 1% per year.

Table 6 shows the results of the analysis, starting in 2019 with 254,494 passenger light trucks and 70,602 freight light trucks. By 2030, the numbers increase to 316,431 passenger light trucks and 87,785 freight light trucks.

We apply the three adoption rates (5%, 10%, and 15%) to each. This means emissions decline slightly over time, offset by the increase in the number of non-electric light trucks. The results are summarized in Table 7. By 2030, at the 15% adoption rate, there are over 65,000 electric light trucks (LDET) on the road, but emissions only decline by 0.107 Mt.

Table 6: Total emissions LDGT to LDET (Passenger ■, Freight ■, and 2019 emissions ---)

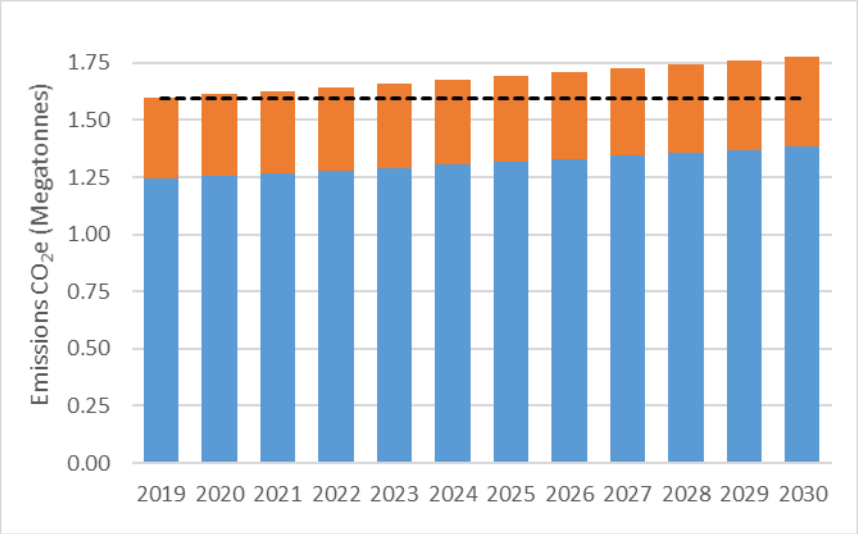


Table 6.1: LDGT only: BAU (Net change: +0.181 Mt)

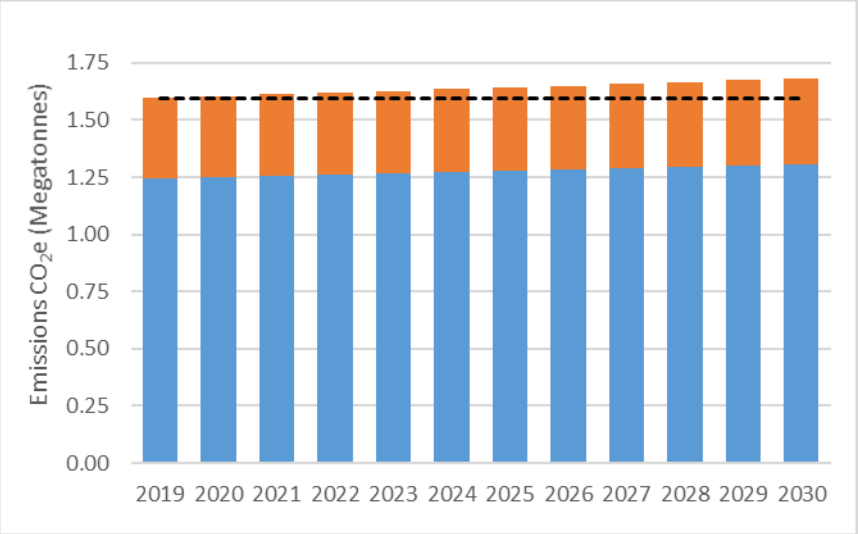


Table 6.2: LDGT to LDET 5% adoption (Net change: +0.085 Mt)

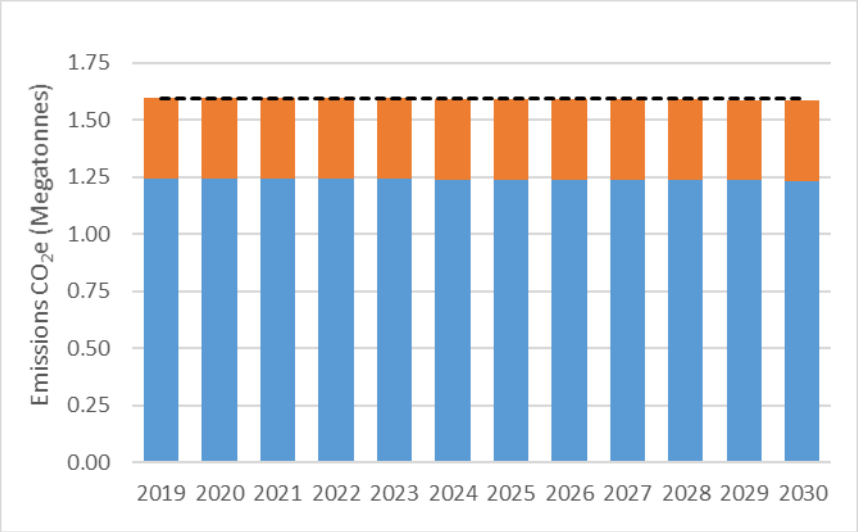


Table 6.3: LDGT to LDET 10% adoption (Net change: -0.011 Mt)

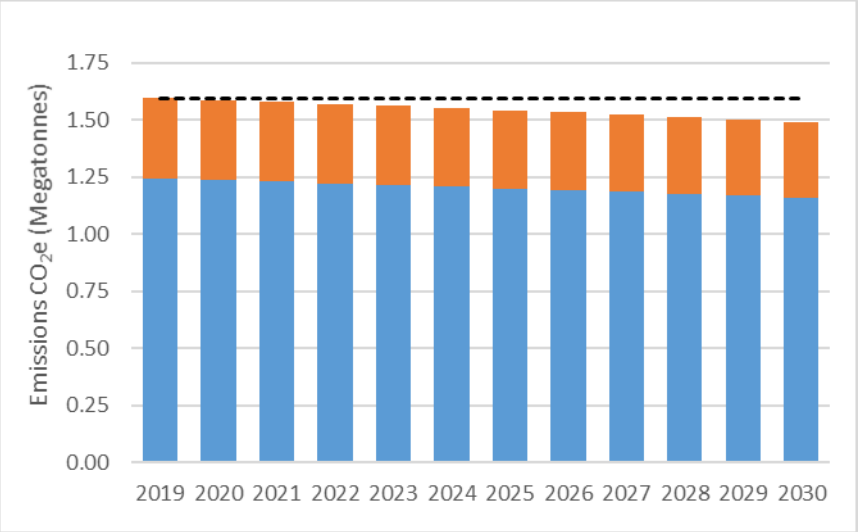


Table 6.4: LDGT to LDET 15% adoption (Net change: -0.107 Mt)

Table 7: Summary of LDGT to LDET in 2030 by adoption rate

	Passenger Light Trucks			Change in Emissions	Freight Light Trucks			Change in Emissions	Total Change
	Vehicles	LDGT	LDET		Vehicles	LDGT	LDET		
BAU	316,431	316,431	0	0.141	87,785	87,785	0	0.040	0.181
5%	316,431	299,369	17,062	0.066	87,785	83,052	4,734	0.019	0.085
10%	316,431	282,306	34,125	-0.008	87,785	78,318	9,467	-0.002	-0.011
15%	316,431	265,244	51,187	-0.083	87,785	73,585	14,201	-0.024	-0.107

Light Duty Gasoline Vehicles

Demand for Light Duty Gasoline Vehicles (LDGV) is falling as people abandon cars in favour of SUVs. This is true in Nova Scotia. We use data from NRCan to determine the characteristics of the LDGVs: fuel consumption was assumed to improve 1% per year, ownership declined at 0.5% a year (which is lower than listed by NRCan), and average distance driven between 2014 and 2018 was 21,000 km, which is used as the average distance driven between 2019 and 2030. The number of vehicles in 2019 was estimated to be 329,736.

The results of the analysis are shown in Table 9. With the decline in demand for LDGV, there is a decline in emissions between 2019 and 2030 of 0.155 Mt. This decline increases as the number of LDEVs increases.

Table 8 summaries the results for 2030 by adoption rate. At 15%, the number of LDEVs is over 51,000 with a decrease in emissions of 0.310 Mt, of which 0.170 Mt is from the decline in LDGV.

Table 8: Summary of LDGV to LDEV in 2030 by adoption rate

	Total Vehicles	LDGV	LDEV	Change in emissions (Mt)
BAU	311,372	311,372	0	-0.170
5%	311,372	294,157	17,215	-0.217
10%	311,372	276,942	34,430	-0.263
15%	311,372	259,727	51,645	-0.310

Premier Rankin's promise in February 2021 of $9 million for electric vehicles ($3,000 for new EVs, $2,000 for used EVs, and $500 for E-bikes) would subsidize a maximum of 3,000 new EVs, 4,500 used EVs, or 18,000 E-bikes.

At the 5% adoption by 2030, this would subsidize about three years of used EVs (about 1,500/year) or less than one year at 15% adoption (about 4,500/year). In other words, such sums may result in positive press coverage for the Premier, but do little to address the issue of vehicle electrification.

Table 9: Total emissions LDGV to LDEV (2019 emissions ---)

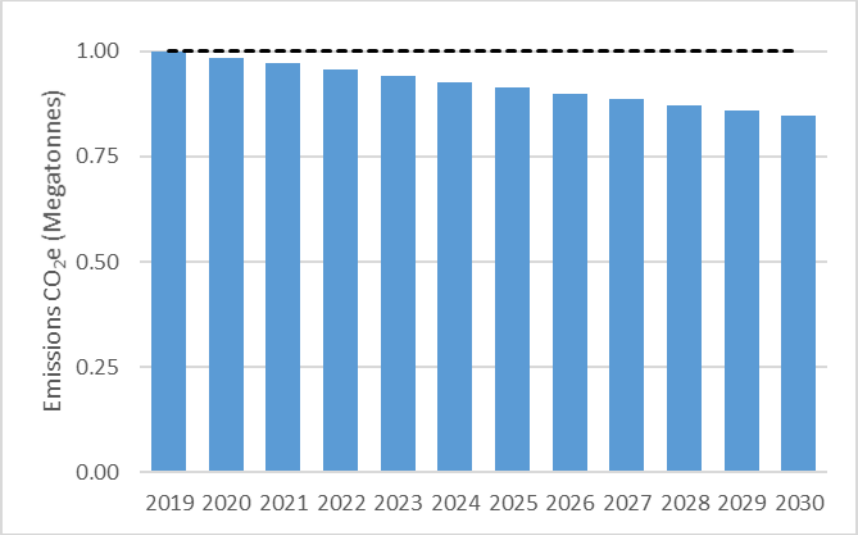


Table 9.1: LDGV only: BAU (Net change: -0.155 Mt)

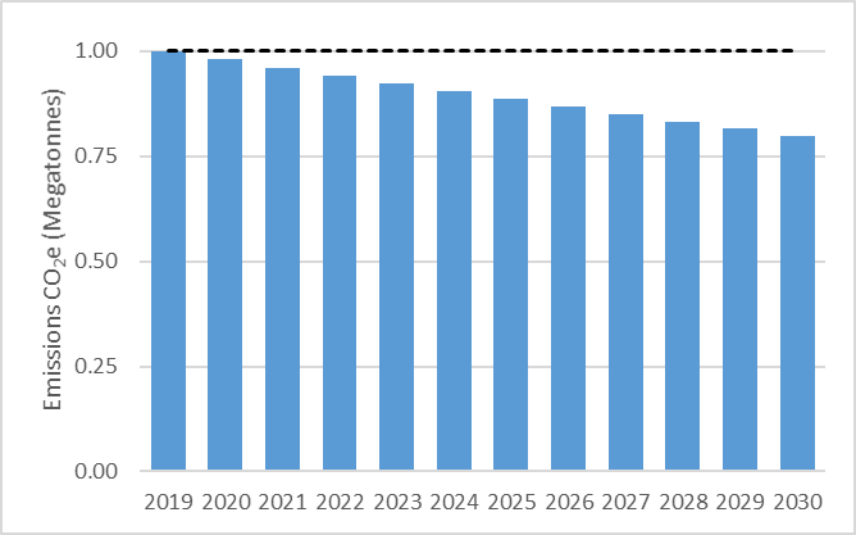


Table 9.2: LDGV to LDEV 5% adoption (Net change: -0.201 Mt)

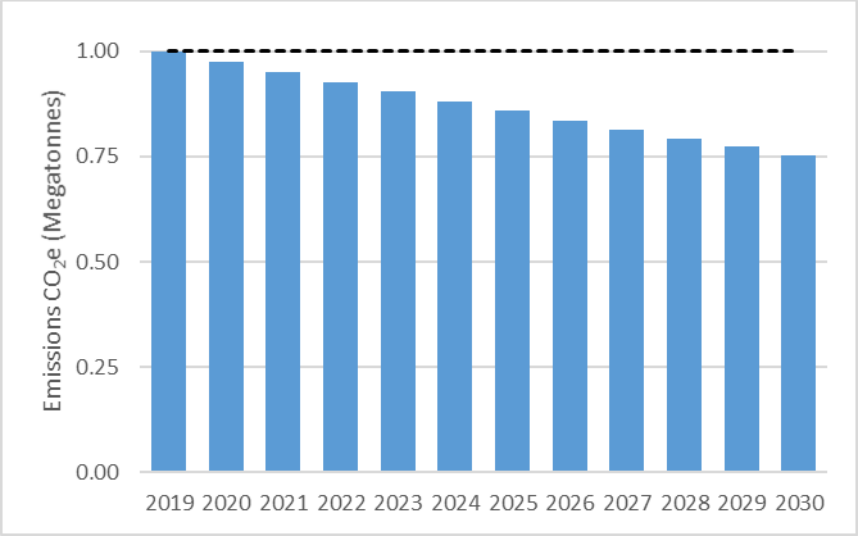


Table 9.3: LDGV to LDEV 10% adoption (Net change: -0.248 Mt)

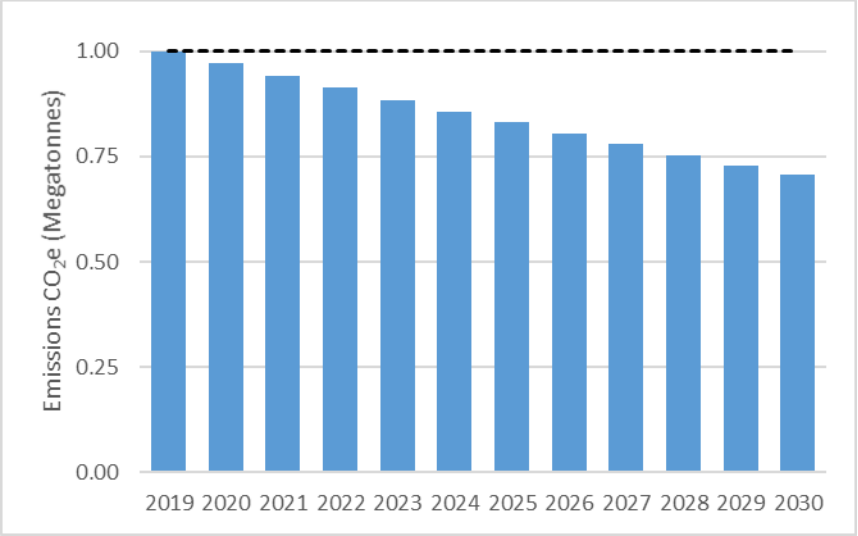


Table 9.4: LDGV to LDEV 15% adoption (Net change: -0.295 Mt)

Other road vehicles

Other road vehicles are Heavy-Duty Diesel Vehicles (HDDV) and the remaining vehicles categories with emissions under 1 Mt. The analysis results are summarized in Table 10. Since most of these are small to start with, their total reduction is small as well. By 2030, at 15% reduction, emissions would decline about 0.213 Mt.

Table 10: Emissions summary for other road vehicles in 2030 (Mt)

Category	Category	BAU	-5%	-10%	-15%
Heavy-Duty Diesel Vehicles	HDDV	1.048	0.996	0.944	0.891
Heavy-Duty Gasoline Vehicles	HDGV	0.309	0.293	0.278	0.263
Light-Duty Diesel Vehicles	LDDV	0.024	0.023	0.022	0.021
Light-Duty Diesel Trucks	LDDT	0.024	0.023	0.022	0.021
Motorcycles	Motorcycles	0.011	0.011	0.010	0.010
Totals		1.417	1.347	1.276	1.205
Change in emissions		0.000	-0.071	-0.142	-0.213

Non-road transportation emissions

Non-road transportation is dominated by Other Transportation which is off-road vehicles, such as ATVs. The remaining members of the category are air, sea, and rail (emissions from international air transport and international sea transport are not included in Canada's inventory of emissions).

The results of the analysis are shown in Table 11, with emissions decreasing from 1.545 Mt in 2019 to 1.314 Mt in 2030 or -0.232 Mt with a 15% decline.

Table 11: Emissions summary for non-road transportation emissions in 2030 (Mt)

Category	BAU	-5%	-10%	-15%
Domestic Aviation	0.294	0.279	0.264	0.249
Railways	0.158	0.150	0.142	0.135
Domestic Navigation	0.474	0.451	0.427	0.403
Other Transportation	0.619	0.588	0.557	0.526
Total	1.545	1.468	1.391	1.314
Change	0.000	-0.077	-0.155	-0.232

Summary

Table 12 summarizes the province's emissions reductions at various reduction rates. For example, in 2030, if 15% of all Light Duty Trucks and Light Duty Vehicles were electrified and the remaining sources of transport emissions were to reduce their emissions by 15%, transport emissions would fall an impressive 0.861 Mt.

Achieving such a reduction in such a short span of time is highly unlikely, given the lack of policies in place to cause such a transition.

Table 12: Transportation emission reductions (Mt)

Category	BAU	-5%	-10%	-15%
Light Duty Trucks	0.181	0.085	-0.011	-0.107
Light Duty Vehicles	-0.170	-0.217	-0.263	-0.310
Other road	0.000	-0.071	-0.142	-0.213
Non-road	0.000	-0.077	-0.155	-0.232
Total	0.011	-0.280	-0.571	-0.861

4.4.2 Buildings

Buildings (or the built environment) refer to residential and service industry (commercial and institutional) structures.[12] Emissions from buildings come from the combustion of fuels such as natural gas, home heating oil, and biomass fuels (unsustainably harvested),[13] primarily for space and domestic hot water (ECCC 2020, UNFCCC 2020). There are no residential emissions from the use of electricity; any emissions associated with the generation of electricity are indirect emissions and the responsibility of the electricity provider (Nova Scotia Power in this case).

Residential and service industry emissions in Nova Scotia's built environment between 2005 and 2019 are shown in Figure 9. In 2005, emissions were evenly split between service industry and residential buildings.[14] By 2019, emissions in the built environment had declined by about 0.66 megatonnes, with the residential sector responsible for about two-thirds of the total (1.3 megatonnes).

[12] According to Environment and Climate Change Canada, "The Commercial/Institutional subcategory also includes GHG emissions from the public administration subcategory (i.e., federal, provincial, and municipal establishments). GHG emissions for these subcategories are from fuel combustion, primarily related to space and water heating."

[13] According to the UNFCCC's Common Report Format, "*biomass… emissions should not be included in the national total emissions from the energy sector. Amounts of biomass used as fuel are included in the national energy consumption but the corresponding CO2 emissions are not included in the national total, as it is assumed that the biomass is produced in a sustainable manner. If the biomass is harvested at an unsustainable rate, net CO2 emissions are accounted for as a loss of biomass stocks in the land use, land-use change and forestry sector.*"

[14] This was due to an accounting practice used by Statistics Canada in the early 2000s, in which commercial fuel suppliers purchasing space heating fuel from a refinery were considered the end-user of the fuel, rather than the residential or industrial end-user. However, end-use customers purchasing fuel from a fuel supplier working for the refinery were considered the end-users. By 2007 the practice had ended, allocating the emissions to the end-user rather than the transporter of the fuel.

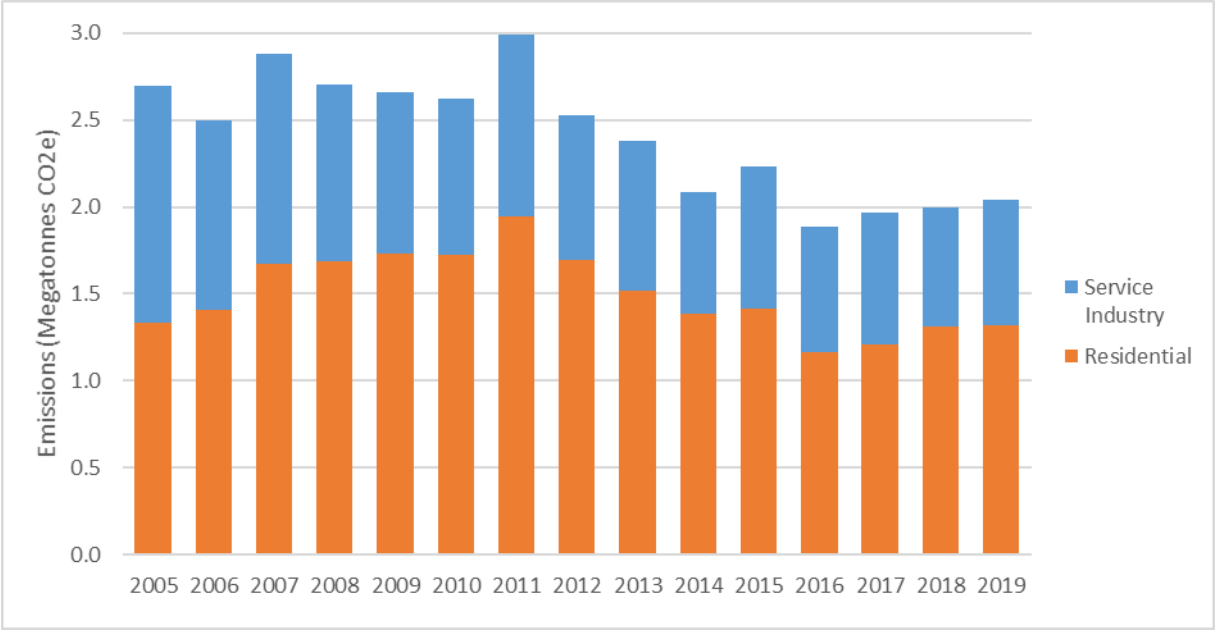


Figure 9: Emissions in Nova Scotia's built environment

Emissions reduction in the built environment can be done using any of the 3Rs in buildings that use a carbon intensive fuel (such as fuel oil, natural gas, biomass harvested unsustainably, propane, or coal):

Reduction: In a reduction, the same fuel and heating source are used for space or water heating, or both; however, the demand for the energy required is reduced, leading to a reduction in emissions if the fuel used was emissions intensive. Reduction is typically done by modifying the building envelope so that its heat loss (in winter) or heat gain (in summer) is reduced.

Replacement: Replacement (replacing one energy source with another and using the same process or replacing the process and using the same energy source) can lead to a reduction in energy demand and might reduce emissions. If the building replaces its lighting from incandescent bulbs to LEDs (light emitting diodes), it will probably reduce its electricity demand but not its emissions (any emissions reduction would be the result of the electricity supplier using less emissions-intensive fuels). If the building were to replace an existing low-efficiency oil furnace (60% efficient) with a high-efficiency furnace (85%), its demand for energy would probably decline as would the building's emissions.

Replacing electric baseboard heaters with a fuel pump (new process with the same fuel source) would reduce demand for electricity but it would have no impact on the building's emissions since the process and the energy used are non-emitting. As with replacing an incandescent bulb with a LED, any change in emissions will be the responsibility of the energy supplier, not the end-user.

Restructuring: Emissions in a building can be reduced to zero by replacing both the process and its energy source. Examples include replacing an oil furnace (using fuel oil) with a heat pump

(using electricity), replacing a natural gas stove with an electric stove, and replacing an oil-fired water heater with an electric water heater.

Residential emissions

Residential emissions are due to two processes: space heating and water heating (for domestic hot water or DHW), and their energy sources: light fuel oil, wood, natural gas, and other carbon-intensive fuel sources such as propane and coal.

The 2018 emissions data for space and water (DHW) heating in Nova Scotia's Residential sector are shown in Figure 10. In both cases, heating oil is responsible for most residential emissions, with wood a distant second.[15]

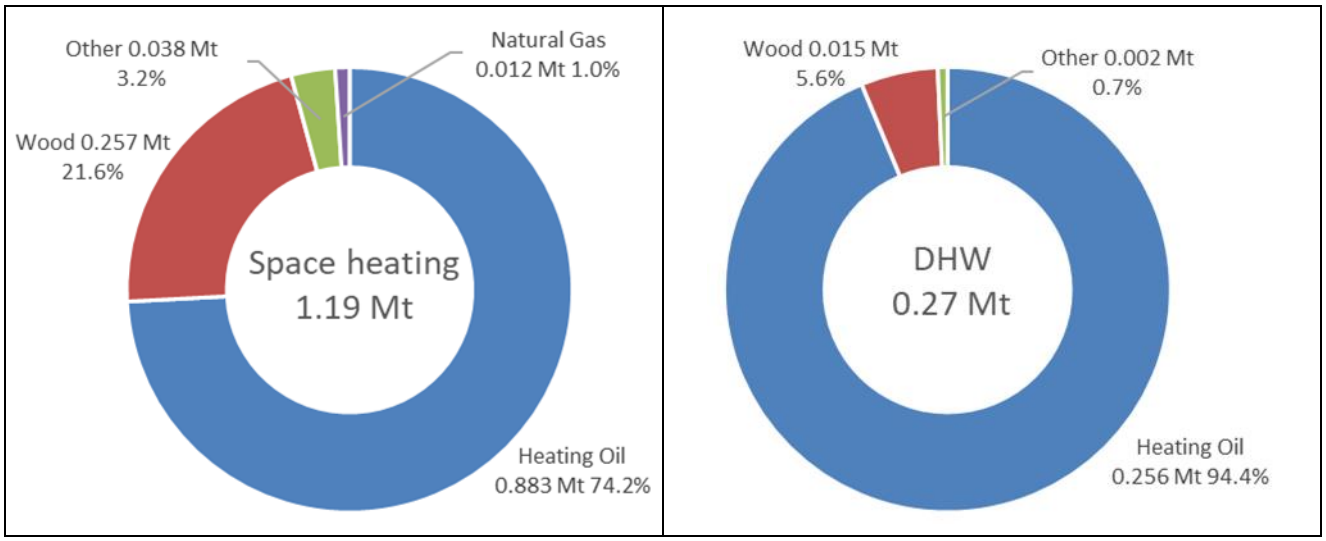


Figure 10: Nova Scotia's residential emissions sources in 2018.

There are three major challenges facing anyone designing an emissions reduction strategy for Nova Scotia's residential sector. First, about 40% of the secondary energy used in the residential sector is fuel oil; second, more than half of residential buildings are heated by oil; and third, Nova Scotia's population is growing. This means any reduction in emissions in existing buildings could be offset by new buildings designed to use an emissions-intensive energy source.

Residential emissions in 2019 were 1.3219 Mt. Table 13 shows four scenarios for emissions in 2030 (5% through 20% below the 2019 value), the 2030 reductions (for example, emissions declined to 1.1236 Mt if a 15% reduction was achieved), and the total reduction in megatonnes (for example, a 10% reduction would result in a decline of 0.1322 Mt).

[15] Although wood is considered a renewable source of energy by ECCC, NRCan includes its emissions in their residential calculations. For the remainder of this section, we will be using ECCC's data.

Table 13: Emissions reduction scenarios for residential sector

Reduction	Emissions (Mt)		Total reduction (Mt)
	2019	2030	
5%	1.3219	1.2558	-0.0661
10%	1.3219	1.1897	-0.1322
15%	1.3219	1.1236	-0.1983
20%	1.3219	1.0575	-0.2644

Table 14 shows how the four emissions reduction scenarios could be met through restructuring (replacing an oil furnace with a space heating system using a non-emitting source of energy). Five different efficiencies of furnace are used. In each reduction scenario, we determine the total number of furnaces to be removed between 2020 and 2030; for example, to achieve a 10% reduction, 17,464 furnaces emitting 7.57 t of CO_2e/year (Furnace 2) would need to be replaced. This would mean a total of 1,588 furnaces would need to be removed each year (30 per week) and replaced with a non-emitting energy source. Finally, the annual replacement cost (in millions), assuming each restructuring would cost $5000 each; in the example, it would cost about $7.94 million a year.

Table 14: Required restructuring in residential sector[16]

Total reduction		Furnace 1	Furnace 2	Furnace 3	Furnace 4	Furnace 5
	Furnace (t CO2e/yr)	9.19	7.57	6.76	4.73	4.22
5% 66,066 t	Total furnaces	7,189	8,729	9,775	13,965	15,641
	Replacements/year	654	794	889	1,270	1,422
	Cost M$/year	$3.27	$3.97	$4.44	$6.35	$7.11
10% 132,187 t	Total furnaces	14,384	17,464	19,559	27,941	31,294
	Replacements/year	1,308	1,588	1,778	2,540	2,845
	Cost M$/year	$6.54	$7.94	$8.89	$12.70	$14.22
15% 198,280 t	Total furnaces	21,576	26,196	29,338	41,911	46,941
	Replacements/year	1,961	2,381	2,667	3,810	4,267
	Cost M$/year	$9.81	$11.91	$13.34	$19.05	$21.34
20% 264,373 t	Total furnaces	28,767	34,928	39,117	55,881	62,588
	Replacements/year	2,615	3,175	3,556	5,080	5,690
	Cost M$/year	$13.08	$15.88	$17.78	$25.40	$28.45

Service Industry emissions

Service Industry emissions are from commercial and government institutional space and water heating applications. Since detailed data is not available from NRCan for commercial and institutional emissions in Nova Scotia (the sector's emissions are grouped with the other Atlantic Provinces), we will use ECCC's NIR data for Service Industry emissions.

[16] Furnace data from Efficiency Nova Scotia: Furnace 1, 80 MBTUs/yr "old"; Furnace 2, 80 MBTUs/yr "new"; Furnace 3, 80 MBTUs/yr "condensing"; Furnace 4, 50 MBTUs "new"; Furnace 5, 50 MBTUs, "condensing".

Service Industry emitters are typically large buildings or multi-building campuses (such as universities, colleges, hospitals, government complexes such as prisons, and shopping malls); most of their emissions are from space heating. Changing these systems can be a major restructuring requiring access to a new energy supply and possible new furnaces, such as replacing boilers using bunker C with more efficient natural gas boilers using natural gas. Moreover, once this restructuring has been done (from an emissions intensive source to one that is less emissions intensive, as was done by the hospitals and universities on the Halifax Peninsula in 2006 and is being done in other institutions across the province with trucked natural gas), potentially at a significant cost to the organization, there would be little enthusiasm to repeat the process to switch to some form of non-emitting heating.

With this in mind, we considered the impact of reducing Service Industry emissions from 2019 levels (0.7155 Mt) by 5%, 10%, 15%, and 20% by 2030. The results are shown in Table 15, with emissions declining by -0.0358 Mt (5%) and -0.1431 Mt (20%) by 2030.

Table 15: Reduction scenarios for Service Industries

Reduction	Emissions (Mt)		Total reduction (Mt)
	2019	2030	
5%	0.7155	0.6797	-0.0358
10%	0.7155	0.6439	-0.0715
15%	0.7155	0.6081	-0.1073
20%	0.7155	0.5724	-0.1431

Summary

The total decline in emissions for both Residential and Service Industry is shown in Table 16 for three different reduction scenarios. If emissions remained unchanged from 2019, they would be 2.037 Mt in 2030. However, if emissions were to decline by 15% in the entire Built environment, emissions would decline about 0.372 Mt

Table 16: Total reductions in Built environment (Mt)

	BAU	5%	10%	15%
Residential	1.322	-0.066	-0.132	-0.264
Service Industry	0.715	-0.036	-0.072	-0.107
Total	2.037	1.936	1.834	1.666
Reduction		-0.102	-0.204	-0.372

As with transportation, one of the major limiting factors in reducing emissions is the cost of a new heating system and the age of an existing heating system. Restructuring to achieve decarbonization in building is essential; however, a building owner might balk at making a change to a new heating system if the building's existing system has just been installed and is still being paid off. Again, this is an example of where policy reflecting the urgency of the climate emergency is essential, in this case, changing the building code to reflect this.

4.4.3 Oil, Gas & Coal

The Oil, Gas & Coal group includes energy emissions from upstream and downstream oil and natural gas operations (i.e., conventional oil production, natural gas production and processing, petroleum refining, and natural gas distribution). The change in emissions in this group are shown in Figure 11.

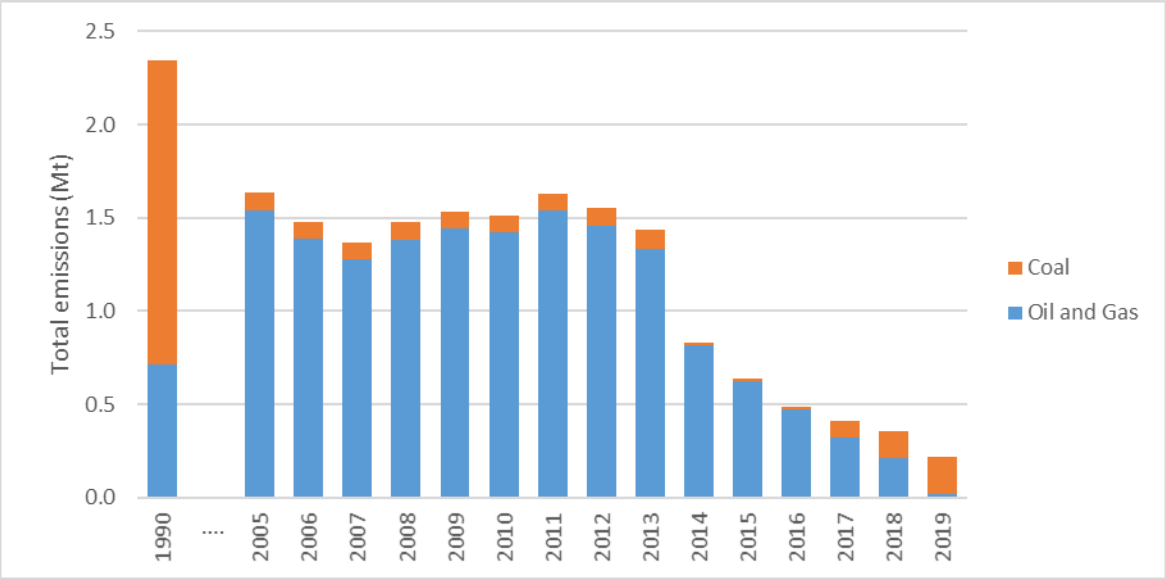


Figure 11: Oil, Gas, and Coal emissions 1990 and 2005-2019

In 1990, the major emissions source in this group were fugitive emissions from coal mining (1.6 Mt) and refining (0.7 Mt). By 2005, with limited coal production, the major emissions sources were the offshore natural gas plays (0.4 Mt) and the Dartmouth refinery (1.1 Mt). The closure of the refinery in 2013 caused emissions to drop by about 40% from 2013 to 2014. Emissions continued to decline with the shuttering of offshore natural gas production in 2018.

In 2012, Shell and BP were awarded offshore exploration licenses by CNSOPB. Despite the promises of offshore wealth, exploration has all but ceased with BP giving up half of its acreage and Shell surrendering its licenses in December 2017.[17] In January 2020, BP was granted a one-year extension to its license; this license was extended again until 2022, another firm deadline.

The reopening of the Donkin mine for the export of coking coal was responsible for the growing volume of emissions from coal production (0.2 Mt in 2019). However, repeated roof falls caused the mine to be shut in March 2020.[18] Although coal demand is projected to increase in many countries (not only in Asia, but the EU and the U.S., despite growing concerns over environmental, social, and governance issues), nothing has been said publicly to suggest the mine will reopen.

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[17] Laura Wright, CNSOPB, Personal communication, 9 July 21. For map of current licenses, see here.

[18] According to Kameron, the owners of the mine, the roof falls meant mine was simply idling the project for an indeterminant period, in part because of the pandemic. However, news reports suggest that the closure is permanent.

Other than limited emissions from natural gas distribution (about 0.005 Mt in 2019), we assume that emissions will continue to decline in the Oil, Gas & Coal group over the next decade.

The projected 5%, 10%, and 15% declines for 2030 are summarized in Table 17. If emissions were to remain unchanged from 2019, they would be 0.222 Mt, although with a 15% decline, they would fall by 0.033 Mt to 0.189 Mt. These declines could be an underestimation if the all extractive energy industries in the province are shuttered by 2030; this would leave only emissions from natural gas pipelines (about 0.010 Mt) as the sole source of emissions in Oil, Gas & Coal.

Table 17: Summary of emissions decline in Oil, Gas & Coal by 2030

	BAU	5%	10%	15%
Total	0.222	0.211	0.200	0.189
Reduction		-0.011	-0.022	-0.033

This could change if Pieridae's long-promised liquefied natural gas (LNG) production train for Goldboro begins operation in the mid-2020s to produce LNG for Germany, as its projected emissions are about 3.7 Mt. In May 2021, Pieridae proposed setting up a carbon capture and storage facility in Alberta to offset these emissions, although questions remain as to the feasibility of these measures. At the end of June 2021, Pieridae put the project on hold pending a final investment decision.

4.4.4 Other

The "Other" group refers to the province's emissions sources with less than one megatonne of emissions in 2005: Heavy Industry; Waste; Agriculture; and Light Manufacturing, Construction and Forest Resources. Except for Agriculture on-farm fuel use, emissions in these sectors are from non-energy sources. As previously discussed, emissions from the consumption of electricity are the responsibility of Nova Scotia Power, not the end-user.

Between 2005 and 2019, all categories except Light Manufacturing, Construction and Forest Resources (LM, C & F) experienced a decline in emissions (see Figure 12). Some of the declines in Waste and Agriculture are due in part to changes in management practices, others reflect changes in the province's economy, with an ongoing decline in Heavy Industry.

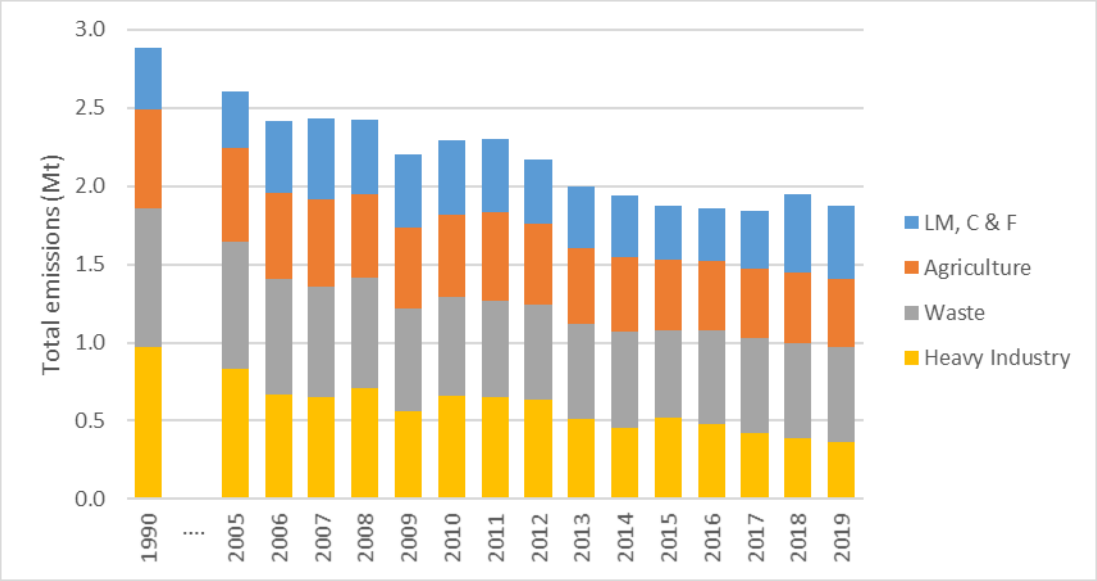

Figure 12: "Other" group emissions 1990 and 2005-2019

Between 2005 and 2019, we find:

Heavy Industry: Emissions in this sector fell by over 56% between 2005 and 2019, reflecting the changes in Nova Scotia's economy, with the decline in mining, pulp and paper, and chemicals and fertilizers. The decline in Heavy Industry emissions can be attributed to actions such as *replacing* carbon-intensive liquid fuels with natural gas and *restructuring* by using electricity rather than a carbon-intensive fuel for an industrial process), or simply the shuttering of some manufacturing facilities.

Waste: Emissions fell by 25% between 2005 and 2019, due in part to changes in how waste is handled. Zero emissions from waste seems unlikely as long as we have municipal solid waste landfills, wood waste landfills, sewage sludge, and municipal solid waste composting.

Agriculture: Agricultural emissions declined by 27% between 2005 and 2019 (0.597 Mt to 0.434 Mt). Farm fuel use (separate from Transportation) was responsible for about 0.1 Mt of the decline, with emissions from animals responsible for the remainder. Crop-related emissions were stable. During the same period, agricultural GDP increased by 20% in the province with crops, rather than animals, responsible for the increase.

The federal 2030 emissions plan expects agricultural emissions to remain constant between now and 2030, in part because of new measures to reduce methane (CH_4) from manure and nitrous oxide (N_2O) from fertilizers.

Light Manufacturing, Construction and Forest Resources (LM, C & F): Between 2005 and 2019, Light Manufacturing and Construction increased their emissions by about 0.11 Mt, reflecting the growth in post-industrial and service industries. Emissions from forest resources are related to the decomposition of woody biomass.

Summary

Possible changes in emissions in the Others category by 2030 are shown in Table 18. If emissions were to decline 15% by 2030, emissions would fall by 0.281 Mt, from 1.874 Mt in 2019 to 1.592 in 2030. Such a significant decline seems unlikely in some of these sources (such as Waste and Agriculture), while in others, such as Heavy Industry, it seems possible, given changes to Nova Scotia's economy.

Table 18: Summary of emissions decline by source in 2030

Source	BAU	5%	10%	15%
Heavy Industry	0.362	0.344	0.326	0.308
Agriculture	0.434	0.412	0.391	0.369
Waste	0.610	0.580	0.549	0.519
LM, C & F	0.468	0.444	0.421	0.398
Total	1.874	1.780	1.686	1.592
Change		-0.094	-0.187	-0.281

4.5 Discussion and Summary

In this section we examined possible changes in emissions between 2019 and 2030 in the five emissions category: Electricity; Transportation; Buildings; Oil, Gas, and Coal; and Other. We showed that to meet the province's 53% reduction target, either:

- The Atlantic Loop is completed by 2030, thereby allowing Nova Scotia Power to reduce its emissions from about 6.8 Mt in 2019 to about 0.5 Mt in 2030. By doing so, the province can achieve its 2030 emissions target of 53% below 2005 levels, provided all other emitting sectors increase their emissions by no more than 0.8 Mt.
- Non-NSP emitters reduce their emissions if the Atlantic Loop is not completed by 2030. We considered two cases, the required reductions if Nova Scotia Power could only meet its median reduction scenario and its high reduction scenario. In the median scenario, non-NSP emitters would need to reduce their emissions by 1.2 Mt, and in the high scenario, non-NSP emitters would need to reduce their emissions by 2.6 Mt.

Table 19 is a summary of four emissions scenarios for emitters other than Nova Scotia Power in 2030. It shows results from Business As Usual (which assumes no change from 2019 levels in any source other than LDGT and LDGV, leading to a slight increase in emissions) to a 15% reduction by every source.

The reductions range from the possible (-5%) to the overly optimistic (-15%):

- The lack of a comprehensive transportation strategy means that most of the reductions in the Transportation category are due to a natural decline in LDGV ownership rather than policy. Decarbonizing programs (such as electrifying part of Halifax Transit's bus fleet and Nova Scotia Power's fast chargers) are dependent on federal funding.
- There is often confusion over the reduction of emissions in the Buildings category. Decarbonizing a building requires the building to restructure (i.e., oil furnace to electric heat

pump); decoupling through replacement (i.e., incandescent bulb to LED) reduces the building's electricity demand but it does not decarbonize the building.[19]

If restructuring leads to replacing a high emissions source such as oil with a low emissions source such as natural gas (or even natural gas mixed with hydrogen), emissions will decline, but not as much as had a non-emitting source been chosen. Moreover, it then locks the building into using that source for the life of the heating equipment.

- The outlook is somewhat mixed for Oil, Gas, & Coal. With the shuttering of offshore natural gas projects and exploration slowly drying up, emissions will continue to decline. However, emissions could increase if coal mining was to resume (an unlikely event), there was increased interest in natural gas leading to more fugitive emissions of methane, or Pieridae was to go ahead with its planned LNG export facility (the outcome of the provincial election will determine the likelihood of this event occurring).
- Emissions from the Other category will probably be dominated by declines in Heavy Industry and Forestry, depending on the demand for new infrastructure requiring products such as concrete and lumber, although as was discussed, there are ways to reduce emissions in these sectors. Methane escaping from the waste stream will remain an ongoing issue, although the federal government (in conjunction with the United States), is pushing to reduce these emissions.

Table 19: Summary of emissions reduction scenarios for non-NSP emitters by 2030

Source	Change in emissions (Mt)				Threats to reduction
	BAU	-5%	-10%	-15%	
Transportation	0.011	-0.280	-0.571	-0.861	Uptake of EVs and ETs is slower than needed
Buildings	0.000	-0.102	-0.204	-0.306	Slow uptake in changing from emissions-intensive fuels to non-emitting fuels
Oil, Gas, & Coal	0.000	-0.011	-0.022	-0.033	Offshore discovery, resumption of coal extraction, increase in demand for natural gas, or building of LNG plant
Other	0.000	-0.094	-0.187	-0.281	Increased building increases LM, C & F Methane and other gases increase Waste emissions
Total	0.011	-0.487	-0.984	-1.481	

If Nova Scotia Power fails to meet its 2030 low-emissions target, reductions will be required from the non-NSP emitters. If Nova Scotia Power meets its median-emissions target in 2030, a reduction of 15% by the non-NSP emitters would ensure the province's 53% reduction target.

However, if Nova Scotia Power can only achieve its high-emissions target, none of the scenarios discussed in this section offer any hope of the province reaching its 53% reduction target.

[19] Laying claim to any reduction in Nova Scotia Power's emissions will become increasingly difficult as Nova Scotia Power continues to decarbonize.

Whether or not you agree with the results shown in Table 19, the fact remains, basing an emissions target on hope rather than evidence-based policy makes little sense, especially given the need to make significant reductions in emissions.

5 2050 – Net zero[20]

The 2019 Environmental Goals and Sustainable Prosperity Act requires that Nova Scotia achieve net-zero emissions by 2050. Since there is no specific emissions target, the province faces the prospect of purchasing emissions sinks to achieve net-zero.

This section explains net zero, describes number of the types of emissions sinks, and the need for Nova Scotia to know its emissions sinks, institute protocols to maintain existing sinks, and develop new emissions sinks.

5.1 Net zero

A jurisdiction's total emissions are the sum of its actual emissions from all emissions sources and any emissions sinks it may claim (typically a combination of changes in land use or forestry, or both, technologies for carbon capture and storage or use, and emissions credits purchased in emissions trading systems):

$$Total\ Emissions = Emissions\ sources - Emissions\ sinks$$

When a jurisdiction reaches its net-zero target date, it will be in one of three states, determined by its total emissions:

$Total\ emissions = 0$: In this state, the jurisdiction's emissions sources are offset by its emissions sinks and the jurisdiction has achieved net-zero emissions.

$Total\ emissions < 0$: The jurisdiction is a net sink; after removing its own emissions, it still has "sink space" to remove additional emissions. The jurisdiction could, for example, use the space to attract industries from emissions intensive jurisdictions or sell the space as emissions credits to jurisdictions that are net emitters (see below). (As with the Covid-19 vaccines, there would always be the danger of jurisdictions hoarding emissions credits to force up the market price.)

$Total\ emissions > 0$: The jurisdiction's emissions sources exceed its sinks, making it a net source. If a jurisdiction in this state is required to achieve net zero, it should aim to maximize its decoupling and decarbonizing efforts before the net-zero target date. Since the total emissions exceed zero, it will be necessary to obtain emissions credits from jurisdictions that are net sinks. Such purchases will need to be made until the jurisdiction finds other, lower-cost sinks.

Achieving zero-emissions this way could be a costly exercise if there is a significant global demand for the carbon-removal process, as there may well be, given the number of regions and countries pledging to attain net-zero by 2050.

[20] This section was written by Mark McCoy and Larry Hughes.

5.2 Emissions sinks

Emissions sinks can be divided into biological and technological.[21] In either case, the sink is required to remove heat trapping gases (primarily carbon dioxide) from the atmosphere and store or sequester it for an indefinite period.

Biological sinks are those activities that use or enhance biological processes to sequester carbon. Examples include the management and preservation of grasslands, wetlands, and forestland. Activities such as restoring wetlands, reforesting existing forestland, and afforesting long-term non-forested land can also contribute to the removal of carbon from the atmosphere. Carbon removal is not limited to terrestrial sinks; coastal blue carbon approaches refer to land-use and management practices that increase the carbon stored in certain marine and coastal ecosystems.

Climate change is a threat to biological sinks. For example, forest fires and extreme weather events, such as hurricanes, can affect forests, while prolonged drought can affect grasslands, wetlands, and forestlands.

Technological sinks are intended to capture and remove carbon, either before or after it has been emitted and then store it on or under land or in the ocean.

Some examples of technological sinks are biomass energy with carbon capture and sequestration (BECCS) and direct air capture (DAC) in conjunction with carbon sequestration in geological formations (CSGF).

BECCS operates as both a biological sink and a technological sink. The general process of BECCS is that carbon is first captured from the atmosphere into growing plants, the plant matter is used in bioenergy power plants, and resulting CO_2 is captured and stored in geological formations.

DAC is a purely technological sink which only captures CO_2 and does not store it; that job is given to CSGF. There are two methods of capturing CO_2 with DAC (both of which require air to be pulled into a DAC system): using chemical reactions to capture CO_2 from pulled in air and then release it for storage; and using CO_2-adsorbing material to capture CO_2 from pulled in air and then releasing it using heat or a vacuum for storage.

CSGF is a component of the carbon capture and sequestration (CCS) process for both DAC and BECCS. Captured CO_2 must be prepared for storage by being compressed. It will then be ready to be pumped into a suitable geological formation. A crucial component of CSGF is finding the right characteristics of a geological formation that allows for the safe and secure sequestration of CO_2, such as type of rocks, their locations, and depth. Examples of potential storage sites are

[21] The UNFCCC Common Reporting Format (CRF) divides a jurisdiction's emissions inventories (both sources and sinks) into Total Energy, Total Industrial Processes, Total Solvent and Other Product Use, Total Agriculture, Total Land-Use Categories, Total Waste (UNFCCC 2006, 74). While most of the categories are sources, Total Land-Use Categories can be referred to as LULUCF (Land Use, Land-Use Change, and Forestry) and refer to practices that can change forest land, cropland, grassland, wetlands, settlements, and harvested wood products from a source to a sink or vice versa.

depleted oil or natural gas reservoirs and deep saline aquifers, either onshore or offshore. CSGF is used in enhanced oil/gas recovery projects to increase oil or natural gas extraction while also sequestering CO_2.

Another sink option is carbon capture, utilization, and storage (CCUS). CCUS technologies are those which are involved in the CCS process with the option to use the captured CO_2 for various applications where it can be stored. Two examples of CCUS technologies are CSGF for enhanced oil/gas recovery, which was mentioned previously, and the storage of CO_2 in concrete.

Jurisdictions without access to either biological or technological sinks which intend to achieve net zero by a specific date will need to purchase sinks (that is, pay for someone else's sink). It behoves them to get their emissions as low as possible.

5.3 Nova Scotia and its sinks

In November 2020, the federal government brought forward legislation for achieving its 2030 and 2050 targets, 30% below 2005 levels and net-zero, respectively. About half of Canada's 2030 target is projected to be met because of Covid-19 and by the federal government redefining LULUCF (Land Use, Land Use Change, and Forestry) to include it in the total national emissions.[22]

At present, Canada's National Inventory Reports do not include LULUCF in national, provincial, or territorial summaries. However, British Columbia has its own LULUCF inventory, independent of the federal government for its internal emissions inventory.

Three potential sinks included in LULUCF accounting are forests, croplands, and wetlands. Nova Scotia's forests, croplands, and wetlands will be examined below. Additionally, Nova Scotia's carbon storage potential will be discussed.

5.3.1 Forests

According to the 2019 update of the provincial ecological landscape analysis (ELA) reports for Nova Scotia's eco districts, the total area of Nova Scotia's forests is roughly 4.3 Mha (found by summing each ecoregion's forest area provided in the ELA report). Using the ELA data, it was determined that forests constituted approximately 78.3% of Nova Scotia's land area in 2019, thus making forests Nova Scotia's largest carbon sink by land area.

The average CO_2 flux (i.e., change in CO_2 emissions) of Nova Scotia's forests was approximately -9.38 MtCO2/y between 2013 and 2017.[23] The data used to determine this value were collected from permanent forest sample plots (PSPs) in the province. The PSP-based estimations show only change in carbon stocks between measurement periods. Therefore, if a given plot is harvested, it is assumed that all emissions associated with the harvested wood products are emitted entirely at harvest, which will lead to an overestimation of emissions from harvested wood products that store carbon for a longer period as they decompose.

[22] Prior to this, Canada has, like other countries, omitted LULUCF from its national totals. However, to achieve the 2030 and 2050 targets, the federal government has

[23] J. Steenberg (NS Department of Lands and Forestry), personal communications, 26 July 2021.

Additionally, forests and PSPs were stratified by eco region and it is therefore assumed that the sample plots share the same carbon capture characteristics of a given ecoregion. Moreover, emissions from dead organic matter only include coarse woody debris and standing dead trees (i.e., snags) and not litter, fine woody debris, dead tree roots, or soils, which will lead to an underestimation of emissions from forests due to the decomposition of these dead organic matter pools. The total net removal of carbon from forests and harvested wood products is likely overestimated by the PSP-based data.

5.3.2 Croplands

In 2011, the area of cropland in Nova Scotia was 280,889 acres (or 113,674 ha), and the area decreased by 4.8% to approximately 267,406 acres (or 108,218 ha) in 2016. When comparing this value to the total area of Nova Scotia calculated from the data in the ELA reports, cropland constituted approximately 1.96% of Nova Scotia's land area in 2016.

Due to insufficient data available about the ability of Nova Scotia's croplands to absorb or emit carbon, a coarse estimate was made. The most specific data provided regarding the carbon capture ability for cropland is the LULUCF data for the Atlantic Maritime Ecozone (AME), which is that the cropland for this region released approximately 541 $ktCO_2e$ in 2019. This value was scaled down linearly from the cropland data of the AME to the cropland data for Nova Scotia by using the ratio of the area of Nova Scotia to the area of the AME.[24]

The result of this calculation is that Nova Scotia's croplands were a source of approximately 145 $ktCO_2e/y$ rather than a sink in 2019. Due to the coarseness of this estimate, it does not provide an accurate indication of Nova Scotia's croplands sink; therefore, work must be done to produce an accurate estimate. Since it is relatively small in comparison to other sinks and sources, this inaccuracy does not have a significant impact on Nova Scotia's total carbon sinks. Currently, there is no incentive for cropland owners to focus on carbon sequestration on their cropland.[25]

5.3.3 Wetlands

According to the 2019 update of the provincial ELA reports for Nova Scotia's eco districts, the total area of Nova Scotia's wetlands is roughly 383 kha (found by summing the wetland areas provided in the ELA report for each ecoregion). Using the ELA data, it was determined that wetlands constituted approximately 6.9% of the land area of Nova Scotia in 2019; this makes the wetlands Nova Scotia's second largest carbon sink by land area.

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[24] Source: ESTR Secretariat. 2014. Atlantic Maritime Ecozone+ evidence for key findings summary. Canadian Biodiversity: Ecosystem Status and Trends 2010, Evidence for Key Findings Summary Report No. 3. Canadian Councils of Resource Ministers. Ottawa, ON. ix + 100 p. https://biodivcanada.chm-cbd.net/sites/ca/files/2018-02/EN_AtlanticMaritime_EKFS_FINAL_2014-05-07.pdf. The area information reproduced in the calculations is a copy of an official work that is published by the Government of Canada and the reproduction has not been produced in affiliation with or with the endorsement of the Government of Canada.

[25] Derek Lynch (Dalhousie University), personal communication, June 30, 2021

A study of Nova Scotia wetlands examined 55 wetlands consisting of five kinds of wetland across the province during summer of 2017. One portion of the study was to determine the GHG flux from Nova Scotia's wetlands and it was determined that the wetlands emit an average of 1.46 $tCO_2e/ha/y$ as methane and capture 6.45 $tCO_2e/ha/y$, resulting in an average net capture of 4.99 $tCO_2e/ha/y$. Assuming that the net capture rate per hectare in 2019 was the same as in 2017, the area of wetlands and this rate were used to determine that the wetlands were a sink of approximately 1.91 $MtCO_2e/y$ for 2019.

5.3.4 Geological Sequestration of Carbon

While geological sequestration does not include the capture of CO_2 and as such is not technically a sink, it is important to discuss it as the sequestration sites make up Nova Scotia's "natural" carbon storage capacity for captured anthropogenic carbon.

Nova Scotia has the potential to be an important location for CO_2 sequestration due to the geology of the region.[26] While work is being done to estimate the CO_2 sequestration potential in and around Nova Scotia,[27] an estimate can be made for the potential sites that are known, namely the depleted offshore oil and gas fields, if some assumptions are made.

The volumes of oil or gas that were extracted from the Sable Offshore Energy Project, the Deep Panuke Offshore Gas Development Project, and the Cohaset-Panuke Project were approximately 60 billion m^3, 4.2 billion m^3, and 7.1 million m^3,[28] each. Assuming that the volume that can be injected into the depleted reservoirs is equivalent to the volume that was extracted, that the density of supercritical CO_2 being injected into the reservoirs is 600 kg/m^3, and that the reservoirs can retain supercritical CO_2, the potential CO_2 storage capacity of Nova Scotia's depleted offshore oil/gas fields is approximately 38.5 $GtCO_2$. Given that Canada's total anthropogenic GHG emissions were 730 Mt in 2019, Nova Scotia could theoretically store 50 years of Canada's emissions.

One concern for direct air capture (DAC) in conjunction with carbon sequestration in geological formations (CSGF) is the potential for carbon leakage. Carbon leakage may happen anywhere in the CCS process, such as in the capture, transportation, and storage of CO_2. Reasonable questions can be asked like "Does a DAC system capture 100% of the CO_2 fed into it?", "Could pipelines or other methods carrying CO_2 leak?", and "Are the storage sites secure enough to contain CO_2 for potentially thousands of years?". These leakages could have severe environmental impacts if not considered and accounted for in the development of CCS technologies. Any leakage would undo the efforts taken to sequester the carbon, so long-term monitoring of potential leaks is necessary.

[26] Grant Wach (Dalhousie University), personal communication, June 23, 2021

[27] Grant Wach (Dalhousie University), personal communication, July 5, 2021

[28] Source: https://www.cnsopb.ns.ca/offshore-activity//legacy-production-projects/cohasset-panuke

5.4 Summary

While Nova Scotia appears to have significant sink capabilities in relation to its emissions, it is important to remember that today's biological emissions sinks are at risk from tomorrow's worsening climate.

Ideally, Nova Scotia will be an emissions-sink as opposed to an emissions-source, as this could allow it to profit from the sales of its "negative emissions". Given the potential storage capacity for CO_2 in Nova Scotia, storage space could also be sold to other regions. However, without a long term, net-zero policy based on a detailed inventory of the province's existing and potential future carbon sinks, as is being done in other jurisdictions, achieving net-zero could potentially be an expensive endeavour and a missed opportunity.

6 Analysis and Discussion

This report examined the three emissions goals specified in Nova Scotia's *Environmental Goals and Sustainable Prosperity Act* of 2019 for 2020, 2030, and 2050. The findings are summarized as follows:

- It is extremely likely that the province's 2020 target (10% below 1990 levels) will be met because Nova Scotia Power reduced its reliance on coal for the first three quarters of 2020 due to delays in the completion of the Muskrat Falls project and Covid-19, which affected electricity demand and likely the demand for liquid fuels for transportation. Had these events not occurred, the likelihood of achieving the target would still have been high as power from Muskrat Falls would have resulted in a decline in coal consumption. Since Nova Scotia Power's emissions declined in 2019, it is unlikely that the province's emissions will exceed the 2020 target in 2019.
- The 2030 target (53% below 2005 levels) relies on the completion of the Atlantic Loop making power from Hydro Quebec available to the Maritime Provinces. If this occurs, it is highly likely that Nova Scotia Power's emissions will meet one of its best-case scenarios with emissions declining to well below a megatonne.

  However, if the Atlantic Loop is not completed by 2030, sectors other than Electricity, notably Transportation and Buildings, will also need to make reductions. As the report showed, even in the unlikely event that 15% of light duty vehicles and light duty trucks are electrified by 2030, meeting the 2030 could be a challenge if Nova Scotia Power does not meet its best-case scenario.

  Additional reductions in Buildings through decoupling (reducing electricity use by replacing baseboard heaters with heat pumps) could help reduce Nova Scotia Power's emissions, and decarbonizing (changing from an emissions-intensive heating fuel to electricity) would reduce the building's emissions, although it would increase Nova Scotia Power's emissions.

  This will require reductions in the remaining two sectors, Oil & Gas and Other, neither of which are major emissions sources.

  Since we do not know whether the Atlantic Loop will be completed by 2030, the province should develop policies that prepare for the eventuality that it will not be completed on time.
- Declaring that the province will achieve net-zero by 2050 is a convenient way of "kicking the can down the road" while appearing to do something. The challenge facing Nova Scotia will be finding possible net sinks and using these to determine its maximum emissions sources for 2050. Failure to identify, and possibly develop, sinks could prove costly to the province if it must purchase technology or emissions credits, or both. Nova Scotia stands to gain if it can develop its sinks for storing emissions from other jurisdictions.

Of the three sectors with more than one megatonne of emissions in 2018 (Electricity, Transportation, and Buildings), only Electricity has specific targets (Nova Scotia Power's

emissions cap and renewables requirements), while Buildings and Transportation are subject to a minimal carbon price on emissions intensive fuels (based on the province's weak, although federally approved, cap-and-trade system).

In the Buildings sector, there are incentives to reduce emissions through decoupling and decarbonizing. Grants are available for low-income households to decouple by improving the building envelope and to decarbonize by restructuring their heating system, moving from oil to electric heating. Rebates on energy efficient appliances are also available; however, since these are decoupling measures, they reduce energy demand but do not reduce emissions in the Building sector, any reduction takes place in the Electricity sector.

Emissions reduction policies targeting Nova Scotia's transportation sector appear to be intended to minimize the impact on the driving public. This might be a deliberate policy decision, recognizing Nova Scotia's weak economy, the considerable number of non-urban dwellers, low household incomes, and the limited availability of low-cost electric vehicles. However, the province has funded the installation of a limited number of Electric Vehicle Charging Stations (or EVCS), while the federal government, through Nova Scotia Power, has funded both publicly accessible EVCS and a limited number of EVCS for individual homeowners.

Finally, the *Environmental Goals and Sustainable Prosperity Act*, describes two goals, one for 2030 (emissions are to be at least 53% below the levels that were emitted in 2005) and the other for 2050 (emissions will be at net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures).

If these goals are not met, who is responsible?

7 Recommendations

From the analysis and discussion of Nova Scotia's emissions goals for 2020, 2030, and 2050, we make the following recommendations for the province to follow to meet its emissions goals:

1. *Conduct a biannual inventory of the province's quantifiable and verifiable biological carbon sinks and continue to search for potential geological carbon storage sites that are quantifiable and verifiable.*
   - Identify each sink's threats and vulnerabilities, and the likelihood of the threat events occurring.
   - Develop protocols to reduce each sink's vulnerability and, if possible, its threats over both the short and long term.
   - These sinks would be used to set the limits on the province's 2050 emissions sources.
   - Locate potential geological storage sites and quantify their potential storage capacity for carbon.
2. *Monitor the progress of the Atlantic Loop (for the 2030 goal).*
   - Failure to complete the Atlantic Loop by 2030 will require other sectors to make significant cuts in their emissions. By monitoring the progress of the Atlantic Loop, the province will know whether it will be completed on time and what other actions are required in other sectors.
3. *Focus on electric vehicle infrastructure rather than subsidizing electric vehicles.*
   - One of the limiting factors of electric vehicle uptake is the availability of EVCS. Subsidizing a few electric vehicles will help a few people, whereas increasing the number of EVCS has the potential to help large numbers of people.
   - If electric vehicles must be subsidized, then the target audience should be those on low-income rather than high-income earners.
4. *Introduce emissions targets for 2035, 2040, 2045, and 2050 (for the 2050 goal).*
   - These should be sector-specific and adjusted over time as knowledge of the province's emissions sinks becomes better understood and the existing and potential causes of changes to a sector's emissions are identified.
   - Given the need to reduce emissions, a four-year emissions-target interval could be introduced to adjust the targets more frequently than in the five-year interval as new information come to light.
5. *Adopt the recently modified federal carbon-pricing system or develop a provincial carbon-pricing system based on the federal backstop for emitters under 50,000 tonnes per year.*
   - The price of carbon would be adjusted over time, reflecting the changes required to meet the province's emission targets in the short-term and the province's 2050 target in the long term.

- As with the federal backstop, rebates would be income adjusted (for low- and middle-income households and small businesses) and paid quarterly.
- The quarterly payments would be adjusted for season, with larger payments during the heating season, and location, with higher payments to households and businesses in rural communities to address transportation costs.

6. *Apply an Output-Based Pricing System to industries emitting over 50,000 tonnes of CO2e per year.*
   - Participants in the cap-and-trade program will include all entities that were previously regulated under the province's Quantification, Reporting and Verification regulations.
   - A biannual annual cap should be designed to let industrial emitters adjust their emissions over time.
7. *Unallocated revenues collected from the carbon levy (emitters < 50,000 t) and the OBPS (emitters > 50,000 t) should fund programs to maintain and enhance the province's carbon sinks.*
   - Maintaining and enhancing emissions sinks should not be supported from general revenues; instead, the cost of the sinks should be covered by the revenues generated from the emissions sources.

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Ms. Laura Wright, CNSOPB

1 November 2021

The Honourable Brad Johns
Chair, Law Amendments
Province House
1726 Hollis Street
Halifax

Dear Mr. Johns,

I would like to have the following considered as part of my submission to today's Law Amendments hearings regarding Bill 57 - Environmental Goals and Climate Change Reduction Act:

Clause 7:

(a) to complete and release a Province-wide climate change risk assessment by December 31, 2022, an update by December 31, 2025, and an update every five years thereafter.

The Act should specify what is to be addressed in the *climate change risk assessment*, is it to focus on adaptation (for example, sea level rise or building retrofits) or mitigation (for example, the status of the Atlantic Loop or the state of the province's natural emissions sinks).

Clause 7:

(f) to require any new build or major retrofit in government buildings, including schools and hospitals, that enters the planning stage after 2022, to be *net-zero energy performance* and *climate resilient*;

(g) to encourage landlords who currently lease office space to Government to transition existing office space to meet *net-zero energy performance*;

(h) to prioritize leased office accommodations in buildings that are *climate resilient* and meet *net-zero energy performance* starting in 2030;

The Act should specify in Clause 2 what the government means by *net-zero energy performance* and *climate resilient*, as is done with other terms used in the Act.

Clause 7:

(j) to develop and implement a zero-emission vehicle mandate that ensures, at a minimum, that 30% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030;

(k) to develop and implement supporting initiatives for the goal in clause (j);

The Act should include provisions that specify a percentage of all zero-emissions vehicles will be made available to low-income Nova Scotians (7j).

It should also specify that the province will increase the number of public Level 3 charging stations across the province (7k).

Clause 7:

(l) to have 80% of electricity in the Province supplied by renewable energy by 2030.

(m) to phase out coal-fired electricity generation in the Province by the year 2030.

These two sections require the completion of the Atlantic Loop. The Act should direct the government to lobby the federal government and get other provinces on-side for the estimated $5 billion it will take to complete the project.

Clause 6:

(b) by 2050, to be net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures.

The province's net-zero plans as outlined in the Act are woefully inadequate. Quite simply, without sufficient natural sinks, the province will be forced to purchase emissions credits from other jurisdictions, a potentially costly exercise. The Act should include a new clause specific to 2050, keeping in mind that we must continue reducing emissions after 2050 (net zero or better) and if we do not achieve net zero by 2050, the province could be required to purchase (expensive) emissions credits and be prepared for the loss of its biological sinks that are at risk from extreme climate events. To this end the province must:

a) *Conduct a complete and accurate publicly accessible biannual assessment of the province's greenhouse gas (GHG) fluxes of the biological sinks (such as forests, croplands, wetlands, and seagrass meadows)*.
b) *Publish a publicly-accessible biannual report which measures, reports, and verifies the carbon-related impacts of the threats to Nova Scotia's biological sinks and conduct an economic and carbon flux assessment of the potential solutions to reducing the threats and vulnerabilities of the sinks*.
c) *Establish interim emissions reduction targets between 2030 and 2050*.
d) *Ensure that emissions are reduced beyond 2050*.
e) *Introduce tax incentives for carbon captured in natural sinks to promote the maintenance of our efforts to increase their carbon capture ability*.
f) *Support the research and development of its geological storage capacity for carbon-sequestration*.

If you or committee have any questions regarding the above, please feel free to contact me at larry.hughes@dal.ca.

Sincerely,

Larry Hughes, PhD

Notes to Accompany a Statement to:

The Law Amendments Committee of the Nova Scotia Legislature
Legc.office@novascotia.ca

Concerning the:

Environmental Goals and Climate Change Reduction Act Bill 57

Monday, November 01, 2021
Virtual Presentation 3:00PM

John Davis, Director
Clean Ocean Action Committee
Co-Chair
Off Shore Alliance
jbdavis@eco-nova.com
902-499-4421

Good Day Committee Members.

Thank you for the opportunity to address you on this critically important Bill. I'm speaking today on behalf of the Clean Ocean Action Committee (COAC) which represents over 9,000 vessel owners, Captains, crew members and fish plant owners, operators and workers who are wholly dependent on a healthy ocean and on the renewable resources it provides. I am also one of those representing the "Offshore Alliance" a consortium of fishery groups and environmental NGO's working to protect our oceans.

I must start by saying that it was distressing to see a bill espousing Nova Scotia's environmental goals that makes no mention of the importance of protecting our oceans and the renewable resources contained therein from the incredibly damaging effects of global warming. I am going to limit my comments to the massive risks to our ocean created by the process of offshore oil and gas exploration and extraction.

The Nova Scotia Seafood Industry supports over 25,000 jobs and generates annually over $2 Billion in export value. The Seafood industry makes a massive contribution to our Provincial GDP and this industry is under immense pressure from the impacts of global warming, ocean acidification, ocean de-oxygenation and changing ocean temperatures.
I will start by saying that:
"There is no jurisdiction on the planet with more to lose from Global Warming than the Province of Nova Scotia. Our Seafood industry is an asset of expanding value and its health is critical to both our economic and social wellbeing."

We feel strongly that it would behoove our Provincial Government to begin to consider Nova Scotia's supply of renewable "Protein Energy" as a major asset of increasing value and importance. Nova Scotia is uniquely positioned to provide the high quality protein energy that both local and international markets

demand. This high quality protein energy is increasing in value every year. By 2050 the demand for ocean based protein will double. The world absolutely requires an increase in this protein Energy. What the world does not require is increasing the supply hydrocarbons to burn as fossil fuels.

A forward thinking Provincial Energy Department might, today be consulting with our Fisheries Minister searching for ways to increase our output of high quality, value added, Protein Energy for world consumption other than attempting to increase the world supply of fossil fuels.

The following notes are broken into two main catagories: **The "Local Threat" and the "Global Threat"** to our renewable ocean resources.

THE LOCAL THREAT

Here is a fact.

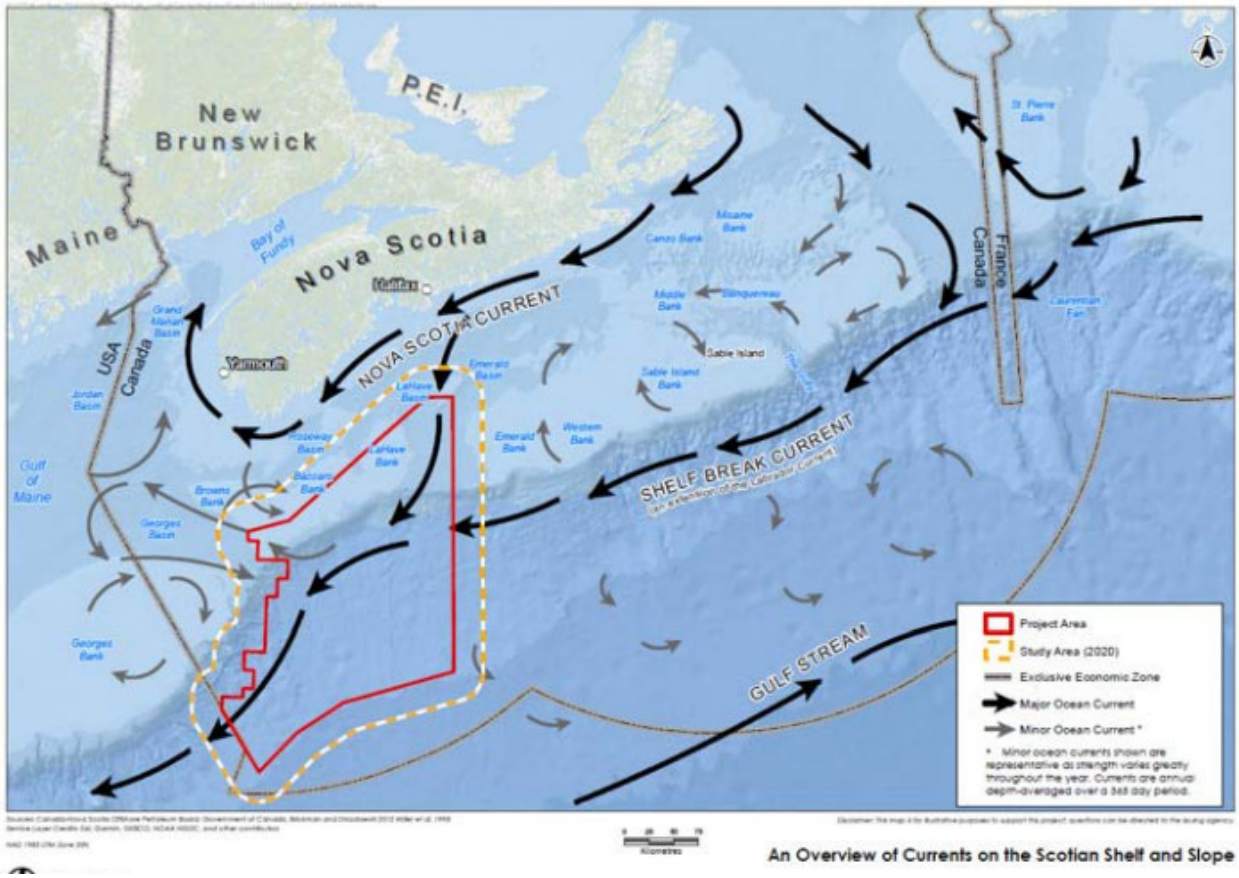
The oil industry is incapable of cleaning up and removing an oil spill from our offshore waters. In your notes you will see

- **A report titled, "Characteristics of Response Strategies" published by**
- **The American Petroleum Institute, the National Oceanic and Atmospheric Administration, the U.S. Coast Guard and the U.S. Environmental Protection Agency makes the following statements when discussing oil spill containment booms;**
-
- **"Boom Effectiveness drops significantly because of entrainment and/or splash-over as short- period WAVES develop beyond 2 to 3 feet (0.6 to 0.9 METERS) in HEIGHT.**
- **Containment and recovery decrease rapidly as slick thicknesses drop below a thousandth of an inch (i.e., very low oil encounter rates)."**
-
- **In a separate report prepared for the U.S. Department of Transportation, the United States Coast Guard, Marine Safety and Environmental, titled,**
- **Field Guide Oil Spill Response in Fast Currents**
- **section 3.3 states;**
- **"Oil will be lost under a boom when the current exceeds about .75 knots. This value is independent of boom skirt depth. Wind loads are not significant in high-current areas but the loads created by wind-induced currents can affect the equipment performance so the effect of the wind must be included."**

Further, you will see in my notes a table taken directly from the Stantec Strategic Environmental Assessment created in March of 2021 for the Canada Nova Scotia Offshore Petroleum Board (CNSOPB) to help justify their recent oil lease offerings. Please note the Mean Wave height:…… At no time, in no season, is the mean wave height within the required parameters for offshore oil spill cleanup and removal.

Table 3.2 Minimum, Maximum, Mean and Standard Deviation of Significant Wave Height at Grid Point 6001526 by Season(1954-2018)

Season	Minimum Wave Height (m)	Maximum Wave Height (m)	Mean Wave Height (m)	Standard Deviation (m)
Winter (Dec – Feb)	0.54	12.79	3.09	1.46
Spring (Mar – May)	0.370	15.28	2.37	1.31
Summer (Jun – Aug)	0.45	14.93	1.46	0.62
Fall (Sep – Nov)	0.45	14.54	2.72	1.19



An Overview of Currents on the Scotian Shelf and Slope

From the same Stantec report are shown the Scotian Shelf currents. There is no time when currents fall below .75 knots and the Bay of Fundy tides are immensely strong. You will note in the chart above the red outlined area. This is the area covered by the Stantec environmental assessment.

In reality, the oil industry has only one option in dealing with an oil spill on Georges Bank or on the Scotian Shelf and that is the use of **chemical dispersants** which break up the oil spill and make the oil slick conveniently disappear below the waves.

It is important to understand that in the U.S., NOAA and 16 additional U.S. government departments and agencies list dispersants as a "contaminant." They do so for good reasons. Dispersant-based chemicals persist in the environment, but the real problem is that dispersants act as a vector, a delivery system, for the highly toxic polyaromatic hydrocarbons in the oil, which allows these toxins to have much greater negative impact on our fish stocks.
Dr. Terry Snell, chair of the school of biology at Georgia Tech and Dr. Samantha Joye, professor at the University of Georgia have been studying dispersant laced oil since the Deepwater Horizon disaster in 2010. They state unequivocally that,

> ***"When commercial fisheries are at risk from hydrocarbon pollution, the use of dispersants is not an advantage. Dispersant use would, in fact, be a disadvantage in trying to protect commercial fish stocks or shellfish species from the toxic impacts of hydrocarbon pollution."***

These facts are well established in the greater scientific community but have apparently escaped the attention of our regulators.

In the Fall of 2015 the Canadian Energy Pipeline Association (CEPA) and the Canadian Association of Petroleum Producers (CAPP) commissioned a Royal Society of Canada Expert Panel to investigate the impacts of oil in an aqueous environment. This panel made many important findings. Among these highly disturbing comments about dispersant laced oil is the following information.

Page 163 Royal Society of Canada Report

> *"Recommendation:* ***Research is needed to: 1) assess the toxicity of dispersed oil to deep water corals, ground fish and invertebrate species that have high economic importance (e.g., lobster, crab, scallops);***
> ***2) Research is needed to model the distribution of deepwater plumes of dispersed oil in relation to areas of known fisheries productivity, such as the fishing banks of Canada's east coast …***

Committee Members, The fishing Banks of Canada's East Coast are our fishing grounds. The Scotian Shelf, Georges Bank and the Bay of Fundy make up the richest multi-species fishery in North America. LFA 40, at the South Western end of the Scotian Shelf is the only designated lobster spawning ground on the East Coast of North America.
World scientists tell us that dispersant laced oil is much more toxic than oil alone. World scientists tell us that you cannot protect fish stocks with dispersants. Canada's best scientists tell us emphatically that more study is needed before we know that dispersants can be used safely near any important commercial species.

We need to listen, Oil exploration and extraction on our fishing grounds cannot be carried out safely.

I will now turn to <u>"THE GLOBAL THREAT"</u>

The following chart explores some of the threats posed by global warming caused by the burning of fossil fuels and the ever increasing amount of CO^2 in our atmosphere and in our oceans.

Ocean Warming

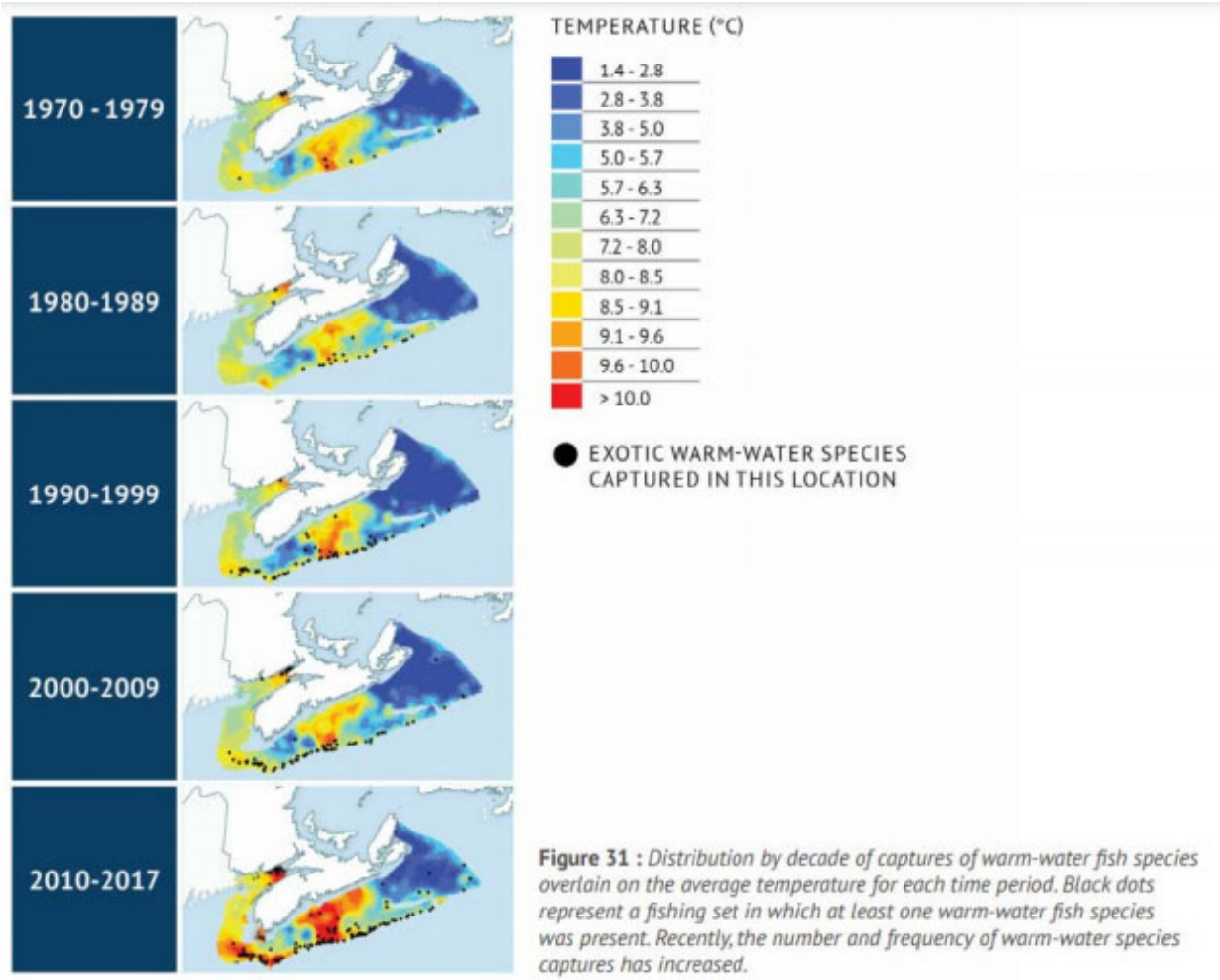


Figure 31 : *Distribution by decade of captures of warm-water fish species overlain on the average temperature for each time period. Black dots represent a fishing set in which at least one warm-water fish species was present. Recently, the number and frequency of warm-water species captures has increased.*

The chart in your notes outlines two important issues. The first is that increased CO^2 in our atmosphere and dissolved CO^2 in our oceans caused by the burning of fossil fuels is responsible for the rapid increase in ocean temperature around the Nova Scotian coast. Warmer ocean temperatures have dramatically increased the number of exotic warm water species invading our waters potentially displacing important local species by moving northward in search of colder water.

One very concerning example of the impact of northwardly migrating species is:

Lobster, epizootic shell disease

Warming water temperatures are impacting the Gulf of Maine and epizootic shell disease is moving north and is now damaging a substantial percentage of lobsters being landed on the coast of Maine. The disease has two major impacts. First, it kills more female lobsters than males and second, the disease deforms the carapace of the lobster rendering it unfit for the very lucrative fresh market. There is no doubt, that as water temperatures continue to rise the epizootic bacteria will continue its march northward. Next season could see Nova Scotian landings impacted by this, Global Warming induced disease.

Reduced Ocean Oxygen Levels

Warming waters affect the ocean and its dissolved oxygen content in several ways. Among other things, it influences the solubility of oxygen in the water. Oxygen levels in Nova Scotian waters are declining.

The continual absorption of CO2 also increases acidity levels, and—when combined with the warming of our oceans—more coral reefs are dying off and can no longer offer a healthy ocean habitat for the commercial species that rely on them for food and protection. Scientists estimate if the current rates of temperature increase continue, the oceans will become too warm for coral reefs by 2050.

Our Provincial Government should recognize that the effort to advance offshore drilling for oil and gas **equates to much less than a zero sum game**. Any short term benefits that might accrue from the extraction of non-renewable hydrocarbons is far outweighed by the local potential of oil spills which would spell disaster for our fishing and tourism industries. Concurrently increases to the world supply of hydrocarbons will amplify the very real impacts of global warming which, in real time, is already threatening our multi-billion dollar Seafood industry.

The United Nations "**Intergovernmental Panel on Climate Change"** (IPCC) and other important environmental groups have called for a complete stop to all new oil exploration and extraction. We cannot utilize the hydrocarbons that are now available and still keep global warming levels to the required maximum of a 1.5 degree Centigrade increase.

In Closing, We have a specific requests of the Committee.
It is:

"We recommend that clause 7 of Bill-57 be amended as follows:

Following point (M) in Clause 7 the creation of a point (N) which states:

"(N) to prohibit all offshore oil and gas exploration activity, and all new offshore oil and gas production and transportation activity as of January 1, 2022, and to phase out all offshore oil and gas-related activity by January 1, 2025."

It is past time that we take action on this issue.
Thank you for your time and consideration

October 31, 2021

RE: Comments Bill 57, Environmental Goals and Climate Change Reduction Act

Via email: legc.office@novascotia.ca

Dear Minister Halman and Members of the Legislative Assembly:

Please accept these comments regarding the October 27, 2021, First Reading of Bill 57.

I sincerely appreciate your government's work in bringing Bill 57 forward. It holds the promise of strengthening the ability of Nova Scotians to work with all levels of government to create the ambitious goals we require to meet the challenges of this time.

My comments (underlined) relate to the following:

4 (b) the achievement of sustainable prosperity is a shared responsibility among all levels of government, the private sector and all Nova Scotians.

I feel it is important to specifically name community organizations in addition to all levels of government and the private sector. Community organizations are an important part of the charitable and service sectors of our economy and bring to the forefront volunteer contributions toward the achievement of goals.

7 (f) to require any new build or major retrofit in government buildings, including schools and hospitals, that enters the planning stage after 2022, to be net-zero energy performance and climate-resilient;

As with other dates mentioned in Bill 57, the date needs to be further specified. After 2022 could be read as starting January 1, 2023, or April 1, 2023.

In this clause, if there are buildings currently in the planning stage, every opportunity needs to be taken to convert plans to Net Zero when possible and as plans move forward.

I read this as a requirement for only provincial government buildings, schools and hospitals. This goal would be improved if the requirement was extended to all municipal buildings. It is my understanding that the Province can set standards at the municipal level. When I served as a councillor for an eight-year term (2012-2020) with the Municipality of the County of Kings, a decision could have been made to build a Net Zero municipal building. Despite the availability of federal grants to support, council hesitated to take that plunge. While an energy-efficient design was selected, it appears to me that council failed future generations in as much as the highest standard was not supported and the opportunity to lead by example was missed.

[redacted]

10 (a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

While conserving at least 20% of the total land and water mass by 2030 is an improvement on the prior government's goal, more is possible and needed. With 2030, less than 10-years away, I would suggest setting a more ambitious goal on a stratified schedule. For example, 20% by 2030, 25% by 2040, 30% by 2050.

Two examples of immediate opportunities to conserve more of the total land and water mass than currently planned are:

- Expanding the recommended boundaries for the Ingram River Wilderness Area. The forests in this area have two stands shown to contain trees that are over 400 years old. However, the boundaries currently proposed do not include one of these stands (the one close to Panuke Lake). I understand the local community is very much in support of an expansion of the boundaries to include both of these stands. The entire 15,800-hectare area should be legally protected.
- Ensuring the 267.62-hectare area that MLA Iain Rankin, while Minister of Lands and Forestry, offered for sale to a private developer, and known to Nova Scotians as Owls Head Provincial Park, is rescued.

10 (c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" prepared by William Lahey in 2018, through the triad model of forest management that prioritizes the sustainability of ecosystems and biodiversity in the Province; and

10 (d) to identify by 2023 the percentage allocation of Crown land dedicated to each pillar of the triad model of forest management referred to in clause (c).

Much ecological damage and loss of biodiversity will occur between the passing of Bill 57 and the date targeted (2023) for implementation of Lahey's 2018 recommendations. Therefore, I urge the government to include in the Act a halting of any clearcutting until the triad model of forest management is finally enforced. The economic downfalls of halting clearcutting pale in comparison to the losses that will occur during the next two fiscal years if clearcutting continues. As I write, logging has begun on over 258-hectares at Rocky Point Lake, Digby County. This is crucial habitat for the endangered Mainland moose. This clearcutting is destroying some of the last wildlife connectivity between the Tobeatic and Silver River Wilderness Areas.

[redacted]

At the very least, the date for implementation of Lahey's recommendations in Bill 57 needs to be advanced to 2022.

14 (b) to develop a Provincial food strategy for enhanced awareness of, improved access to and increased production of local food to achieve 20% consumption of local food by 2030.

Inclusion of school food programs and school gardens needs to be specifically mentioned in this section regarding a Provincial food strategy. This will provide the leaders of tomorrow (today's generation of school-aged children) with hands-on experience and knowledge regarding local food production and consumption and the importance of building food security into everyday practices.

17 The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities to create a sustained funding opportunity for climate change action and support for community-based solutions and policy engagement.

I strongly support the inclusion of this clause. However, I do feel that more needs to be done right now to acknowledge, through immediate action and support, those calls of the Assembly for immediate protection of areas in need of conservation. For example, a year ago, the Assembly demanded that any operations at Fourth Lake be halted until a full mainland moose assessment is done. This is one opportunity of many which I urge the new government of Nova Scotia not miss.

Please do not hesitate to be in touch if you wish to discuss the above in more detail.

Sincerely,

Pauline Raven

Pauline Raven

CC John Lohr, MLA Kings North, Minister of Municipal Affairs and Housing

[redacted]

A submission to the Law Amendments Committee

Concerning the proposed

Environmental Goals and Climate Change Reduction Act

Positive aspects of the proposed act:

I join with others in supporting the clear statement of specific goals and timelines. The decision to embed these goals and timelines in the legislation itself, rather than in regulations, is a worthwhile change from the previously proposed legislation.

Negative aspects of the proposed act:

Like others I am disappointed that Bill 57 extends the implementation period for the Lahey reforms for more than another year. This step will mean that it will be five years before the Lahey report is actually implemented. Five years in which a great deal of harm has been done to our forests and to biodiversity across the province.

Like the NDP I question the wisdom of carrying forward the emission reduction goals of the previous proposed legislation.

Some suggestions:

Statutory review – given the significance of this legislation and the unpredictability of climate change, a clause requiring periodic statutory reviews would be farsighted and make it easy to modify the legislation to take account of changing conditions in climate and their impact on the province; impacts such as the effects of sea-level rise, drought, changes in forest conditions, etc.

Benchmarks/targets for implementation of the Lahey reforms – The clauses in the EGCCRA dealing with the Lahey reforms are scanty, particularly in comparison to some of the other clauses that deal with different aspects of climate change reduction. This is surprising, considering the detail to be found in Lahey's discussion of the need for forest policy reform.

The four sub-clauses in Section 10 of the EGCCRA concentrate on protected areas, the implementation period for the Lahey reforms and the allocation of lands into the three element s of the 'Triad'. The sub-clauses could be expanded to identify other important steps leading to reform. Some examples of these clauses could include:

- Recognition that by encouraging the maintenance of intact forests we can significantly mitigate climate change. (This clause could also be included in Section 7)
- Revision of the *Forests Act* to comply with the amended purpose clause of the *Crown Lands Act.*
- Excluding High Production Forestry from Crown lands until such time as is needed for them to recover from the intense harvesting has taken place on public lands since the acceptance by the previous government of the Lahey proposals.

- Measures encouraging industry and woodland owners to ensure that the need for biodiversity is recognized in their long-range planning for ecological forestry.
- Measures that would enable government to assist industry to retire high-capacity harvesting equipment and to encourage alternative employment opportunities in forest management, silviculture and wood-products manufacturing.
- Development of specific plans, with timelines, for the restoration of the Acadian forest.
- Explicitly prohibiting harvesting biomass for electricity production and for export. (This clause could also be included in Section 7)
- Development of specific plans, with timelines, for expansion of the existing community forest, the creation of new community forests and the expansion of forest areas managed by the Mi'kmaq.
- Updating environmental impact assessment processes to consider the cumulative impacts of developments that would potentially affect wetlands, rivers, lakes, or other aquatic environments.
- Recognizing and encouraging private ownership of forest land for conservation purposes.
- Provision for improved enforcement of ecological forestry policies.
- Provision, again with timelines, for reporting to the public progress on implementation.

Respectfully submitted,

Paul Pross
[redacted]

From: [redacted]
To: Office of the Legislative Counsel
Subject: Bill 57 Law amendments
Date: October 31, 2021 10:58:43 AM

** EXTERNAL EMAIL / COURRIEL EXTERNE **
Exercise caution when opening attachments or clicking on links / Faites preuve de prudence si vous ouvrez une pièce jointe ou cliquez sur un lien

I am very encouraged by the new Environmental Goals and Climate Change Reduction Act (Bill 57). https://nslegislature.ca/legc/bills/64th_1st/1st_read/b057.htm.

A lot of thought and public input has gone into this important piece of legislation over the years, although it had different names. When the Sustainable Development Goals Act was proposed in October 2019 law makers heard more than 8 hours of testimony from the public, with many speakers saying we need more climate change education in the school system. I am also very encouraged by the inclusion of Netukulimk and Etuaptmumk ("two-eyed seeing").

I especially care about Goal 16(e), about education. However, I would like to see it broadened to say "to promote and support environmental education (including climate change education)..." Focusing on climate change education alone can sometimes exclude a focus on the natural world as part of our work on the climate emergency. The words "biodiversity" and "place-based education" do not appear in the Act, so I am concerned there will be little attention paid to learning about the species and ecosystems around us. Biodiversity goes hand-in-hand with actions to prevent Climate Change. Please include such wording and goals in the act.

Please keep in mind the What We Hear report about the SDGA public consultation emphasized that people who provided input wanted: "Education on climate change, ecosystems, biodiversity, and circular economy principles should be included in curriculum for all grades so that everyone graduates with a comprehensive understanding of these topics." See https://cleanfuture.ca/ for the report.

The second change I would suggest is the implied timeline for implementing climate change education (or environmental education) through the curriculum. "Ongoing curricula renewal" could mean incorporation of climate change education into the curriculum in a way that takes many years. We don't have that long! The Department of Education (with limited partners) reviews the grade school curriculum in chunks, such as Grades P - 3, then doesn't revise that grade range again for a long time. Could "with ongoing curricula renewal" be changed to "through immediate curriculum changes at all grade levels"?

Despite these suggested changes, which I do hope you will see as beneficial to consider, I am in support of this legislation as is. We do need it.
Thank you,
Karen L.H. Robinson
Retired President and CEO, Canadians for A Safe Learning Environment (www.casle.ca)
Current co-chair Sandy Lake-Sackville River Regional Park Coalition

Clean Foundation July 26,2021
Submission on the Sustainable Development Goals Act
From the Association for the Preservation of the Eastern Shore (APES)

Attention:Engagement Coordinator
126 Portland Street, Dartmouth, N.S. B2Y1H8
info@cleanfuture.ca

I am writing to you as the president of the Association for the Preservation of the Eastern Shore. Our organization was formed in 2012 when residents and businesses on the Eastern Shore of Nova Scotia became very concerned about Fish Farm leases that were being proposed for our shore. The communities of the Eastern Shore came together as we concluded that not only would this proposed industrial development pollute our waters, it would threaten our backbone industries of lobster fishing and tourism. When a door to door campaign was conducted 93% of people in our communities were opposed to the development of fish farms in our harbours. This industry has no social license.

Since that time we have monitored developments not only on our shore but around the province, country and internationally and our conclusion about the unsustainability of the marine based finfish farm industry has remained. We are members of the Healthy Bays Network, a provincial network of people who are opposed to marine based fish farming.

Open pen finfish aquaculture is NOT an environmentally sustainable industry and as such cannot lead to longer term sustainable prosperity for Nova Scotia. The ongoing problems are too great to be tweaked by band aid measures. These include:

*threat to wild caught fisheries especially lobster which is an important and sustainable industry in our province and is dependent on our “pristine” waters.

*persistent noise,smells and light pollution in coastal waters.

*proliferation of sea lice and infectious diseases.

*escaped fish that have a devastating impact on Atlantic wild salmon undermining recovery efforts.

*feces, chemicals and antibiotics degrading the marine environment

*broken and abandoned net pen debris.

*threat to tourism and the “clean Nova Scotia” brand

*degraded recreational opportunities (swimming, boating, beach walking)

*inadequate regulations and enforcement despite government claims to the contrary

*violation of social license, transparency and accountability

RECOMMENDATION: The provincial government should stop investing and promoting this production model. There needs to be a moratorium put on any new and expanded leases for marine based finfish farms and a transition plan must be developed to get existing farms out of the water. Many other jurisdictions are getting out of this business model and moving to land based RAS systems where environmental issues could be more easily controlled.

Recently, two fish farm leases were renewed on our shore at Owls Head and Ship Harbour. This, despite loud opposition from 42 local organizations and individuals who made submissions in the process. Concerns included pollution, escapes, antibiotic and pesticide use and effects, loss of biodiversity and habitat for wild fish and other species and risks to the lobster fishery and local tourism. The lease was approved with conditions and the proponent has been in non compliance since October 2020. The gear and equipment at the site that resulted from past aquacultural operations was to be removed from the water and adjacent shoreline by this date. This has not been complied with to date even though ongoing complaints have been filed by local individuals and our organization. Our experience is that once leases are approved the local community and concerned organizations lose any ability to raise concerns.

Our organization has been and is concerned about sustainable prosperity that grows our economy while protecting the environment that our economy is so dependent on. Coastal communities around Nova Scotia have been leading the fight to keep fish farms out of our harbours because of the negative environmental and social costs of this industry on our public waters. Community town hall meetings have been packed with people who have many concerns on how this industry will affect their livelihoods, their lives, the environment and their futures. The provincial government continues to propose solutions for rural economic development that are supposedly for “our own good”. The voices of coastal communities who have knowledge and ideas about how to grow our economies while protecting the environment where we live need to be heard. The provincial government has been very patronizing in excluding our voices. We have been saying loud and clear that it is vital that our marine environment is kept healthy.

The present regulations for the proposed development of marine based fish farms exclude community voices. The Aquaculture Review Board, which is the body to hear public concerns about new and expanded fish farm leases, has interpreted the definition of those who are allowed to intervene very narrowly. What is the legitimacy of these restrictions given that one of the legislative purposes of the Nova Scotia Fisheries and Coastal Resources Act, Section 2 (f) is to foster community involvement in the management of coastal resources? It is important to keep in mind that waters that are leased for aquaculture continue to be public waters. There are no such restrictions on public participation in assessment processes for other industrial developments such as mining, offshore oil and gas and construction projects. The spirit of full public participation that was recommended by the Doelle Lahey report is not reflected in the regulations.

RECOMMENDATION: Coastal communities need to be genuinely engaged in the development decisions that affect them directly. The patronizing attitude of the provincial government when it comes to rural development in particular needs to stop!

The Finfish Farm industry is regulated through a series of Memorandums of Understanding (MOU's) between the Provincial and Federal governments. Unfortunately the politicians who are responsible for protecting Nova Scotians and their environment through regulation of this industry are the biggest promoters of the industry. This is a serious conflict of interest.

RECOMMENDATION: The government needs to do the job of regulating industries and protecting our environment.

As rural coastal communities we are on the front line of the effects of climate change with increasing water temperatures, changing and eroding coastlines and the increase in storm, flood and drought events. It is important to look at those factors that will help to mitigate these changes and that will help us adapt to our new environments.

RECOMMENDATION: Identify and protect eelgrass beds that act both as absorbers of CO2 and as habitat for marine species.

Areas of fragile coastline and the adjacent ecosystems need to have real protection from industrial development. Any proposed development should have to be subjected to public consultation and a third party environmental assessment.

During the DFO's Area of Interest process for an Eastern Shore MPA, we (all participants in the process) were confined by jurisdictional limitations which prevented the assessment of impacts of land based industries such as forestry and mining on the marine ecosystem. This,despite well documented, historic impacts of these industries on the riparian zones of estuarial rivers and marine estuaries.

RECOMMENDATION: Any inland industry or development such as mining and forestry that could cause harm to coastal ecosystems must be remediated and all future developments need to undergo environmental assessments that take this interaction into consideration.

Thank you for the opportunity to participate in these consultations.

Wendy Watson Smith, President
Association for the Preservation of the Eastern Shore
[redacted]

CPAWS
CANADIAN PARKS AND WILDERNESS SOCIETY
NOVA SCOTIA CHAPTER

Canadian Parks and Wilderness Society
Nova Scotia Chapter
P.O. Box 51086 Rockingham Ridge
Halifax, NS
B3M 4R8

Re: Bill 57 comments to Law Amendments Committee

October 29, 2021

To: Law Amendments Committee

Hello.

My name is Caitlin Grady.

I'm a Conservation Campaigner with the Nova Scotia Chapter of the Canadian Parks and Wilderness Society (CPAWS-NS).

Thank you for the opportunity to present at Law Amendments Committee today.

The Canadian Parks and Wilderness Society is a national charity that works to protect natural areas in Canada. In Nova Scotia, we work exclusively on the establishment of new protected areas. We work collaboratively with all levels of government to protect places such as Blue Mountain-Birch Cove Lakes, Sable Island, and the St. Mary's River, to name a few examples.

We are a grassroots, science-based conservation organization that maintains expertise specifically on land protection issues. For that reason, our comments today deal specifically with the "land protection" portions of Bill 57.

The Canadian Parks and Wilderness Society is pleased to see the Environmental Goals and Climate Change Reduction Act (EGCCRA) come forward. We participated in the review of the

Environmental Goals and Sustainable Prosperity Act (EGSPA) when that piece of legislation was introduced in 2007.

At that time, EGSPA was fairly unusual in that it addressed many different environmental issues within a single piece of legislation, setting clear targets and timelines for the Nova Scotia government to meet. Over a decade later, the legislation has, for the most part, proved successful. It has held successive governments accountable on numerous environmental issues that operate on timeframes beyond the normal election cycle.

The Environmental Goals and Climate Change Reduction Act builds off of this successful legacy. We are pleased to see Bill 57 - a piece of legislation similar to EGSPA with many targets and timelines on multiple environmental issues - coming forward to carry on the tradition.

Clause 10 deals specifically with the land protection goal.

We want to acknowledge that Clause 10 mentions Indigenous Protected and Conserved Areas (IPCAs) specifically. That is an improvement over the previous versions of this legislation.

The Canadian Parks and Wilderness Society is pleased that the land protection goal is being re-established as a legislated target rather than a policy target. When EGSPA was repealed in 2019, the protected areas target was downgraded from legislated protection to policy protection, which was a step in the wrong direction. We are glad to see that decision being reversed.

We are also pleased that the land protection goal for Nova Scotia is being increased to “at least 20%” of the total land and water mass of the province by 2030, up from the previous policy target of 14% protection. Our natural ecosystems are under immense pressure from industry, through rampant clearcutting and extensive mineral exploration. More protected areas are needed to stem biodiversity loss, to provide better habitat protection, to clean the air and water, to provide places for outdoor recreation and enjoyment, and to store carbon in the fight against climate change.

The higher target is welcome. We also acknowledge that the target specifies “at least” 20% protection. Indeed, this target is a floor, not a ceiling, and there is room for Nova Scotia to exceed 20% protection. The national target for Canada is 25% protection by 2025 and 30% by 2030. Recently, all G7 Nations passed a unanimous motion setting a protected areas target of 30% by 2030. Nova Scotia must continue to scale up its conservation ambition to confront the climate change emergency and biodiversity crisis head on.

The Canadian Parks and Wilderness Society is recommending several specific amendments to strengthen the land protection portion of Bill 57.

At the moment, there are currently about 150 pending protected areas that have been identified by the Nova Scotia government for protection but have yet to receive a legal designation. These sites are contained in the “Nova Scotia Our Parks and Protected Areas Plan”

and have already gone through multiple rounds of public consultation. Clause 10 should be amended to state that the "Nova Scotia Our Parks and Protected Areas Plan" will be fully implemented no later than June 30th, 2022. This is more than enough time to complete the designation process for these pending sites, since all that is required is an Order-in-Council.

We also recommend that Clause 10 be amended to require annual progress reports on achieving the land protection target. It's imperative that the Nova Scotia government not wait until just before the 2030 deadline to achieve this goal. Progress establishing new protected areas is needed every year. There is no time to waste. The climate change portion of this bill has a similar requirement for an annual progress report specific on that environmental issue.

The Canadian Parks and Wilderness Society also recommends amending Clause 10 to specifically state that a collaborative protected areas plan will be released no later than December 31, 2024. The current wording states that a collaborative protected areas strategy will be produced, which, while a good first step, does not go far enough. A collaborative protected areas plan is needed to identify specific sites that are advanced toward legal protection. This is a crucial step in achieving a higher land protection target and, as such, should be written into the legislation.

We would also like to draw your attention to Clause 4. It rightly states that climate change is recognized as a global emergency, but it makes no mention of the second ongoing crisis of rapid biodiversity loss. The two are unquestionably linked and the Environmental Goals and Climate Change Reduction Act should recognize this reality. We recommend amending Clause 4 to state "Climate change *and the biodiversity crisis* are recognized as global emergencies requiring urgent action".

Thank you for the opportunity to present our analysis. Our proposed amendments are presented as helpful recommendations for improving the legislation and we hope that they will be added to Bill 57 by this committee.

I would be happy to answer any questions.

Thank you.

Caitlin Grady
Conservation Campaigner
CPAWS Nova Scotia

Specific proposed amendments to Bill 57 (Clauses 4 and 10)

Clause 4

Current wording:

4(c) climate change is recognized as a global emergency requiring urgent action; and

Recommended amendment:

4(c) climate change and the biodiversity crisis are recognized as global emergencies requiring urgent action; and

Clause 10

Current wording:

10 The Government's goals with respect to the protection of land are

(a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

(b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;

Recommended amendment:

10 The Government's goals with respect to the protection of land are

(a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

(b) to support the goal in clause (a) by fully implementing the existing Nova Scotia Our Parks and Protected Areas Plan no later than June 30, 2022; by developing a collaborative protected areas strategy to be released no later than December 31, 2023; by completing a collaborative protected areas plan to be released no later than December 31, 2024; and by releasing annual progress reports on achieving the protected areas target.

Submission to Law Amendments Committee,
re: Bill 57 - Environmental Goals and Climate Change Reduction Act,
Law Amendments Hearing Nov.1, 2021
Submitted via Legc.office@novascotia.ca Nov 1, 2021

From
David Patriquin
Prof of Biology, Dalhousie University (retired)
Member of the Conservation Committee of the Halifax Field Naturalists
Member of the Board, Nova Scotia Wild Flora Society
6165 Murray Place, Halifax. davidgpatriquin@yahoo.ca

cc: Lisa Lachance (MLA for Halifax Citadel-Sable Island &
member of Law Amendments Committee LisaLachanceMLA@gmail.com

cc: Burkhard Plaque, President, Halifax Field Naturalists burkhardplache@gmail.com
cc: Charles Cron, President,Nova Scotia Wild Flora Society ccron@hotmail.com

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Implementation of the 'Lahey Recommendations' must incorporate carbon accouting/modelling to ensure carbon sequestration is increased.

I am pleased that new PC Government of Nova Scotia is putting forth a fully revised of the landmark 2007 EGSPA in the form of Bill 57, the Environmental Goals and Climate Change Reduction Act (First reading October 27, 2021). It is a very important bill and I hope that there will be further opportunities to comment on it before the final version is passed.

For the moment, I simply want to point out in relation to clauses 10 b and c, that one cannot make the assumption that 'implementing the Lahey recommendations' will help to mitigate climate change. In fact, if the impacts of various scenarios on carbon sequestration are not considered, it could negate many of the gains made through reductions in GHG emissions in other sectors.

The Lahey Report did not cite or otherwise highlight how the proposed changes in forest practices would affect carbon emissions. To illustrate, the word “climate”is cited 9 times, 8 of them referring to effects of climate change and adapting to climate change, 1 to the “business climate”; there is nothing on climate change mitigation in the Lahey Report.

The Lahey Report recommends small- scale wood- energy projects, but there is no accompanying recommendation for Life Cycle Assessments to ensure that they reduce rather than increase carbon emissions.

I and others have expressed particular concern about the impacts of the HPF (High Production Forestry) component on carbon sequestration. I am also concerned about effects of ‘intensive partial harvesting’ on carbon sequestration, if partial harvesting is pushed too hard in the Ecological Matrix.

In fact, continued net loss of high volume, Multi-aged-Old Growth Forest across Nova Scotia and particularly on Crown lands in SW Nova Scotia is likely to reduce carbon sequestration by Nova Scotia forests – unless the supply of wood from Crown lands is substantially reduced.

We need comprehensive and fully transparent carbon accounting/modelling to inform the implementation of the Lahey Recommendations in such a way that carbon sequestration is augmented, not reduced.

It is likely that some of this accounting already exists. Lands and Forestry/Natural Resources & Renewables hired a 'carbon modeller' in 2018, but we have yet to see in public any information about his activities or any results.

I suggest that a clause could be added under 10 to require such accounting, and that the Lahey Recommendations must be implemented in a way that increases carbon sequestration in our managed forests.

From: Office of the Legislative Counsel
To: Smith, Kent
Subject: RE: A request_ Bill 57_ so important!
Date: November 1, 2021 11:28:00 AM
Attachments: image001.png

Thank you!

Nicole LeBlanc-Murray
Legislative Assistant / Assistante législative

Office of the Legislative Counsel / Bureau du conseiller législatif
CIBC Building
802-1809 Barrington Street
Halifax NS B3J 3K8
tel 902 424 8941
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From: Smith, Kent <Kent.Smith@novascotia.ca>
Sent: November 1, 2021 11:20 AM
To: Office of the Legislative Counsel <legc.office@novascotia.ca>
Subject: FW: A request_ Bill 57_ so important!

Hello – I received the attached and am forwarding it to Law Amendments to be added for consideration.

Regards,

Kent

Kent Smith
Member of the Legislative Assembly
Eastern Shore
902-989-3772
kent.smith@novascotia.ca

From: Kim Thompson <shipharbour.thompson@gmail.com>
Sent: November 1, 2021 1:15 AM
To: Smith, Kent <Kent.Smith@novascotia.ca>; Corkery, Kelly <Kelly.Corkery@novascotia.ca>
Subject: A request_ Bill 57_ so important!

Hello Kent,

I am heartened that the new Environmental Goals and Climate Change Reduction Act (Bill 57) has been introduced in the provincial legislature! A lot of thought and public input has gone into this important piece of legislation over the years, first as EGSPA and then as the Sustainable Development Goals Act.

I would like in particular to draw your attention to the Goal pertaining to education which says:
16. The Government's goals to support business, training and education are:
"16 (e) to promote and support climate change education and sustainability through the knowledge and teachings of Netukulimk and environmental stewardship with ongoing curricula renewal, the development of inclusive and accessible resources and professional learning that incorporates diversity and honours Etuaptmumk."

To make this legislation stronger and more meaningful I suggest changing "with ongoing curricula renewal" to "through immediate curriculum changes at all grade levels.". This because we need ramp up the timeline for change, we cannot afford to wait for normal cycle of curriculum reviews. These are urgent times.

I, and the diverse, ever-growing Deanery Project community, strongly support of this important piece of legislation for the environment and our youth - we need it, and we'll be watching (and cheering) to see if government follows through on these commitments!

Thanks for your support and your voice with us on this issue.

All the best,
Kim

Kim Thompson
Executive Director
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Lower Ship Harbour, NS B0J 2L0
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Law Amendments Submission
Environmental Goals and Climate Change Reduction Act (Bill No. 57)

November 1, 2021

I am going to be honest with all of you. Part of me would rather not be here today. I would rather be spending time with my family—something that many environmental advocates sacrifice on a daily basis, in order to fight for climate justice and biodiversity. No one *wants* to spend all of their free time fighting for the environment. No one *wants* to camp out in the forest to protect mainland moose habitat or spend their weekends sending emails that are always ignored.

I am compelled to be here, because the state of our province and our planet demands real change, right now.

I am obliged to be here—because the forests in Nova Scotia are being decimated, sometimes in the name of so-called "green" energy.

I am here—because we are losing biodiversity at a rate never before seen in human history.

I am here—because scientists warn that we are in a "code red for humanity."

I am here—because I'm part of a whole generation that is wondering whether we can (and should) even have children.

I am here—because I'm scared.

But there's another reason.

I'm also here today because I'm hopeful. There are solutions—sometimes very simple solutions—that we can implement. We can look to other provinces and countries and learn from their successes.

We can choose what kind of future we want in Nova Scotia, and I'm hopeful that we will make the right choices for this and future generations.

- Choices like not allowing Northern Pulp to continue its legacy of environmental racism.
- Choices like not selling off Owls Head Provincial Park.
- Choices like not allowing Atlantic Gold to contaminate the drinking water for the next 1,000 years.
- Choices like not allowing endangered mainland moose habitat to be destroyed.

We don't have to choose extinction, inequity, or an unlivable planet. So why would we?

Together, let's choose to not only survive, but thrive.

To do that, we need strong legislation with interim targets, annual GHG-emission goals, and external accountability structures to help us satisfy the objectives in the Act.

This bill needs to define what "renewable energy" entails, and make sure that it does not include biomass, which is the lowest-value use of our forests and assuredly not carbon-neutral.

This bill needs to be upfront about environmental racism (which should be included in the equity and diversity statement).

We also need to significantly move up the timeline for fully implementing the Lahey Report. I am a fifth-generation woodlot owner and I want to see more ecological forestry practices being implemented across the province, because it's not only possible, it's *practical*. No other species willfully destroys the habitats it depends on.

This bill needs to include proper carbon accounting and recognize the true value of preserving our forests, wetlands, eelgrass meadows, and other important carbon sinks. We need to recognize that nature is our greatest ally.

That's why I'm happy that the commitment to legally protect at least 20% of our province for nature conservation by 2030 will be written into law. This is an important step towards aligning ourselves with the national and international targets of 25% by 2025 and 30% by 2030. It's also a hopeful sign that this government does recognize the importance of parks and protected areas—for Nova Scotians, for our tourism industry, and for our environment.

Many Nova Scotians participated in the public consultation for the Sustainable Development Goals Act, in which individuals and groups presented more than 5,000 individual ideas. The summary report says that Owls Head Provincial Park "received a significant amount of comments." Nova Scotians were clear that the delisting and proposed sale of Owls Head Provincial Park were critical issues—for the sake of our protected areas but also for government leadership.

I strongly encourage this government to include Owls Head Provincial Park in its protected areas commitment. This is a necessary step to restore the integrity of the protected areas network and start rebuilding public trust.

Nova Scotia can't reasonably claim to be an environmental leader at the same time that it is selling off a provincial park reserve with significant carbon sinks and biodiversity values.

Nor can the government continue to sanction rampant clear-cutting of our forests, imperilling endangered species by fragmenting or destroying their habitats, or poisoning the water that we all depend on.

Amid the twin crises of biodiversity loss and climate change, we cannot afford to undermine our progress by continuing business as usual. We need to do more than state we're in a climate emergency—we need to act like it. This bill, in its current form, doesn't represent what it means to live in a climate emergency.

But you have the opportunity to change that.

In this time of unprecedented climate change and biodiversity loss, we are at a historic moment to choose differently, about what we value, and how we'll work together to accomplish it.

Thank you for your consideration.

Sincerely,

Lindsay Lee

Presentation to Law Amendments Committee on Bill 57 with a focus on solid waste and plastics
1 November, 2021

Chair, Committee Members thank you for this opportunity to present.

I have been a fan of this Act since it was introduced in 2007. I believe it has made a material difference to the quality of our environment, the quality of our lives, and even the strength of our economy. Putting targets with deadlines in an Act makes a lot of sense. It's what we do when something is important. Another strength of the Act is that it tackles many issues and it attempts to integrate environment and economy. If we don't change our economy, we will not succeed in overcoming the climate crisis, the biodiversity crisis, the plastic crisis….

Perhaps the best thing about this Act is the level of all party support for this Act. All the parties that have been in power have advanced it, and when in opposition, they have continued to support it, only calling for it to be strengthened. I don't know if there is a similar precedent like this across Canada.

Bill 57 continues this spirit and practice. I applaud its breadth of goals and its attempt to integrate environment, economy and equity. It is good to see the concept of two-eyed seeing embedded in the Act. Etuaptmumk, combining Indigenous knowledge and science, is an integrative concept itself. I am glad to hear Albert Marshall will be presenting. It is also good to see training, and labour, business brought into the Act.

Before I focus on section 15 of the Act. I want to leave you with an idea. You may have heard about the MaRS(Medical and Research Science) Centre for Impact Investing in Toronto. MARs has been highly successful in sparking research, innovation and investment. What about a similar centre here is Nova Scotia focused on the environment. I would be happy to elaborate at another time.

I presume many of the specific comments you're hearing are about increasing ambition and sharpening language. Mine will be along these lines.

I am going to focus on section 15, solid waste, specifically plastics.

The only goal in the Act that is the same as the 2007 goal is solid waste. It was 300 kilograms/per person/per year in 2007 and it is 300 kilograms in Bill 57. Now maybe it

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should be lower than 300 kg, but my main concern is that with the current timelines in the Act we will not meet this goal again in 2030, 23 years later.

Currently, our waste per person per year is 420 kg. Even at that number we are lower than some other provinces but that is primarily because we don't have the manufacturing that provinces like Quebec and Ontario have.

The main reason we have been stuck at over 400 kg is because the provincial government—at the leadership level--has been consulting, talking, planning, negotiating and not doing for the last decade or more. There were consultations and reports produced in 2011 and 2015 but little action followed.

Bill 57 proposes a deadline for a plan for 2023, up to 2 years plus from today. 2 years for a plan and only plan.

I think if you canvassed most stakeholders including industry and municipalities, you would find the appetite for another round of broad consultations to be low, to put it mildly.

Recommendation:
Replace 15 c) in Bill 57 with language adopting or endorsing the 2015 report entitled 'What we Heard'.
https://novascotia.ca/nse/waste/docs/Solid-Waste-What-We-Heard-Report-March-2015.pdf

One of the main recommendations to come out of the 2011 and 2015 consultations is extended producer responsibility. We have it one form or another for a number of items in this province already including electronics, tires and product stewardship for pop bottles. There has also been consistent support for disposal bans on items that shouldn't go into landfills and instead be recycled or composted.

I wholeheartedly support 15a) and the inclusion and expansion of EPR.

The Government has been sitting on Extended Producer Responsibility for printed paper and packaging, most of which is plastic, since 2015. This inaction, despite high levels of support from Nova Scotians, municipalities, the recycling sector and many businesses and concerted efforts by municipalities and Divert NS to address any lingering concerns. Divert NS released a report written by Dr. Avalon Diggle and Dr. Tony Walker in 2021.
https://divertns.ca/research-reports

Recommendation:
The Government should move forward with EPR for PPP right away. This doesn't have to be in Bill 57.

As with many issues an intelligent approach can create new economic opportunities this is particularly true with waste where recycling, reuse and even reduction can boost the local economy. New Brunswick has already moved forward on EPR for PPP. We should look at regional collaboration on solid waste including on reduction and recycling.

Recommendation:
Add a clause supporting a regional(Atlantic Canadian) economy for waste reduction and recycling.

There is also the opportunity for the Government to lead on waste reduction and recycling through government procurement.

Recommendation:
Government will reduce waste and increase recycling through government procurement.

I want to end with plastics. Nova Scotians are using more plastics. Plastic is now the number one item in your blue bin. It is the number one litter item. This is partly because plastic is a versatile item but it is also because the oil industry is hoping demand for plastic will make up for declining demand for oil in other sectors.

Think of a plastic item in the environment as an oil or toxic spill in slow motion. As you've likely heard micro-plastics are making their way into our food, particularly seafood, our soil, water and even the air we breathe. We have every reason to reduce our use of plastic and recycle what we do use. This is a form of pollution that we, as Nova Scotians, have a lot of control over. If we throw a Tim Horton's cup out the window, that plastic pollution is likely to remain in Nova Scotia forever. Perhaps a superficial point, but if our beaches and roadsides are littered with plastic it undermines our effort to be a green destination or leader.

The Federal Government, along with the provinces, municipalities and First Nations, has responsibility for plastics. I encourage the Government to work with and support the Federal Government in its efforts to address plastic pollution.

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The number one thing the province can do to reduce plastic use and pollution is to bring in EPR or product stewardship for as many plastic items as possible from mattresses, textiles to coffee cups as well as ban single use plastics. One year ago, the Government banned plastic bags. From what I can determine this has been a success.

In closing I urge the Government to greatly accelerate and up the action on waste. If we wait until 2023 for a plan we will not meet the goal of 300 kilograms/per person/per year in the Act. Thank you.

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Presentation to the Law Amendments Committee by the Green Party of Nova Scotia on Bill 57, Environmental Goals and Climate Change Reduction Act

November 1, 2021

Good Afternoon and thank you for providing this time for me to offer comments on Bill 57 on behalf of the Green Party of Nova Scotia. I'm sure the significance of what we are doing here today is clear in the context of the meeting of world leaders who are tackling Climate Change in Glasgow Scotland in COP 26. We are all being called to do our part in this Global challenge which is of apocalyptic proportions. If we succeed then future generations will look back and celebrate what we have done today. I urge all of you to ensure Nova Scotia, when judged, stands on the right side of history. It is incumbent on all of us to act in the best interest of coming generations who have put their future in our hands.

I want to begin by congratulating Minister Halman and the Government for introducing this Bill. It is not often a political party goes beyond what it promised on the campaign trail. Bill 57 does that and as Greens we applaud you. We believe this bill should pass for the good of the province and our country. However, and here is the 'BUT' you were all no doubt expecting, we would like to see amendments to strengthen this bill.

In the interest of time I will touch on the ones that we consider most significant. I would point out that the bill uses the word “encourage” six times. I would suggest that the government is not a cheerleader that stands on the sidelines and shouts encouraging words to the team on the field. You are the quarterback; you call the plays. If we are to win you need to be fully in the game. Look at those areas where you have used the word encourage and decide what concrete action you will take to get the result you want.

In section 6 (a)...you set your targets...oh so close...to continue with my football analogy you are on the 7 yard line...and you decide not to go for it. You are about to waste your third down...set your sights on the actual goal. To keep global temperatures below 1.5 degrees celsius, by 2030 Nova Scotia needs to aim to be 60% below 2005 levels. Please raise the goal.

Congratulations on moving ahead the date to phase out coal fired electricity generation. We believe you could also move ahead the dates of other goals, for example you could start right now prioritizing leased Government space to buildings that are climate resilient and net zero...no need to wait 9 years. And

addressing and mitigating barriers for testing and treatment of rural wells shouldn't be put off 5 years.

The implementation of the recommendations of the Lahey report should start now, immediately, no need to wait until 2023. If you implement the Lahey recommendations now you can start working on implementing other sustainable forestry practices and eliminate clear-cutting. Also, we applaud the government's goal in Section 12 to modernize the environmental assessment process. However, no need to wait 3 years, and we would suggest that "Social License" be added to the list of matters to be taken into consideration.

In Section 14, a) we would refer you to the "What We Heard" report done by Clean Energy for the previous government. It heard from close to 1500 Nova Scotians on a number of the issues covered by this Bill. There was a strong show of support from those who were consulted for a phasing out of open-pen fin fish farms by 2025. The government of BC and the Federal government will start phasing out open-pen fish farms next year. It is important that Nova Scotia send a signal to the industry that new farms will not be licensed and a plan is being put in place to transition away from the open-pen farms we now have. Ample advanced warning is in the best interests of the industry allowing it to better plan around an

orderly transition. The government should also start work on establishing the criteria for land-based fish operations to ensure that a high bar is set for this emerging industry in this province.World leaders in this field are currently operating in Nova Scotia. Now is the time to encourage this industry to grow sustainably rather than play catch up in the future.

In the next section, 15, a) we are also calling for you to be more specific. Again, you don't have to take our word for it, the majority of those consulted in the Clean Energy report, What we Heard, and the Nova Scotia Federation of Municipalities are calling for Extended Producer Responsibility (EPR) for paper and packaging. It is already in place in 5 provinces, BC, Sask., Man.,Que. and Ont. and is under development in NB. Once paper and packaging areaddressed, mattresses, mercury-containing lamps, lithium batteries, sharps (needles), propane cylinders, and other difficult-to-manage hazardous household wastes could be added in the future.

We're almost done...in section 19 and 21, the act makes reference to the Round Table. We are pleased to see that the Premier will meet with the group. We would like to ask the government to consider adding a representative of the Green Party of Nova Scotia to the Round Table. It would be a way to give the nine-thousand Nova Scotians, who obviously feel strongly about sustainable prosperity

and voted Green, a way to be heard on these critical issues. We would also suggest that 21, clause 2 be strengthened by changing the wording from “The minister may seek advice from the Round Table,” to “the Minister WILL seek advice from the Round Table.”

Before I conclude I to acknowledge the elements of the act that point to including Mi’kmaq teachings and practice and the principle of ensuring this act serves all Nova Scotians equally. It talks of working with racialized and marginalized communities to create sustainable funding “for climate change solutions and supprt for community-based solutions and policy engagement.” These are laudable goals and could go a long way toward dealing with environmental racism but there don’t appear to be any concrete or measurable actions outlined in the Bill. We will be watching to make sure these words become reality in the near future.

And finally, in Section 21-3….the date given for the annual report is on or before July 31st...given that we now know our next election is July 15th 2025, I suggest that the date for this report to be submitted should be changed to June 30th.

I’m a firm believer that we can’t let Perfect Be the Enemy of Good. This is a good start. The bill could be better. As Greens we are proud to consider ourselves the vanguards of sustainable prosperity, and therefore we are pleased to see some

of our vision and values reflected in this government's priorities. We encourage both the government and the opposition to consider the suggestions we have made to amend this Bill in the interest of all Nova Scotians.

Submitted by Jo-Ann Roberts, Deputy Leader, GPNS

My name is Emma Norton, I, like you, live and work in Mikmaki the unceded territory of the Mi'kmaw people. I specifically live in Punamu'kwati'jk or Dartmouth. I am the Director of Communications and Atlantic Canada Organizer with the Climate Emergency Unit. The Climate Emergency Unit is a project of the David Suzuki Institute and we seek to move governments and institutions into emergency mode.

By studying Canada's mobilization for the Second World War and COVID-19, policy researcher and Climate Emergency Unit's team lead, Seth Klein, has identified five markers of a government in emergency mode:

- Marker 1 - Spend what it takes to win, which according to former World Bank chief economist Nicholas Stern and author of the Stern Review on the Economics of Climate Change, is two per cent of a government's GDP
- Marker 2 is "create new institutions to get the job done".
- Marker 3 is "move from voluntary change to mandatory change" with clear targets and near term dates.
- Marker 4 is "tell the truth about the severity of the crisis and the measures necessary to combat it".
- Marker 5 is "leave no one behind"

While moving in the direction of several of these markers, Bill 57 does not meet any of them. However, it does have the potential to be a level floor upon which a strong climate plan can be built to take adequate emergency-level climate action. In order to make this Bill stronger and capable of facilitating the climate measures that scientific consensus has deemed necessary to address the climate emergency: it needs a few things

- Better accountability
- A stronger target
- Faster phase out of fossil fuels
- Inclusion of environmental racism

I have a few specific suggestions for Bill 57 as it relates to all of these.

This bill's nearest mandated goals related to greenhouse gas emission reductions are for 2030, namely:

- Item 6.a) to have Nova Scotia's emissions 53% below it's 2005 Greenhouse gas levels by the 2030, and the
- Item 7.m) a zero-emission vehicle mandate that ensures, at a minimum, that 30% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030

We need targets that are sooner than 2030, or an accountability mechanism within Bill 57 that assures us that emissions will be reduced before 2030. A 2040 and 2050 goal is nice, but the world has a carbon budget that we are on track to exceed before 2030. The latest report from the International Panel on Climate Change was released earlier this year, while many of you were in political campaign mode. It had a dire warning: we have only 9 years at our current greenhouse gas emission levels to have a 66% of limiting warming to 1.5°C. Climate scientists urge policy makers to consider the world's carbon budget and what each jurisdiction's and sectors' carbon budget would be. The global carbon budget 400 billion tonnes of carbon dioxide emissions ($GtCO_2$) as of 2020 with an uncertainty range of plus or

minus 220 GtCO2. To have a 66% chance of remaining within the budget would require CO2 emission cuts of about 10% per year globally with other greenhouse gases like methane following a similar pathway.

In Nova Scotia, our 2019 emissions were about 16 Megatonnes. If we assume our emissions are the same today, and if we were to reduce our emissions by 10% a year, as suggested by the IPCC, it would mean Nova Scotia's carbon budget is 104.2 Mt between now and 2030. However, the data tracking for climate and greenhouse gas emissions is under-resourced so that we only know our emissions from two years ago because we rely on the federal government for our greenhouse gas measurements. It is important, when in an emergency, we have up to date information. I suggest the provincial government follow in the footsteps of the BC provincial government and establish its own greenhouse gas inventory.

I know that numbers aren't very compelling, but they are important. I am putting all these numbers on record in hopes that our Premier Tim Houston is listening, as the first time I met the Premier he reminded me that he is a numbers man.

This all brings me to the recommendation that item 8.a) read:

8.1 The Government shall create a strategic plan, prior to December 31, 2022, to be known as the "Climate Change Plan for Clean Growth" that addresses

(a) achieving the greenhouse gas emission targets set out in Section 6 ***through the creation of a provincial carbon budget and provincial greenhouse gas inventory***;

Further to this that the item 8.2 read:
The Government shall release annual progress reports on the plan outlined under subsection (1) **with updated carbon budgets** and review and renew the plan within five years of its release.

Ideally, the carbon budget will be written into legislation before the plan is renewed in 2026.

I further suggest that the accountability of the plan be improved by ensuring that a third party, such as an environmental commissioner, reviews the reports. This environment or climate change commissioner could be within the office of the Auditor General. Ontario had an environmental commissioner and I include the wording for the creation of their environmental commissioner in the appendix of my submission (Appendix 1).

That concludes my recommendations regarding accountability.

I support the push from the Ecology Action Centre and their supporters to change the legislated 2030 target to be 58% below 2005 levels. To quote the Ecology Action Centre:

> "This target represents the minimum emission reductions required by Canadian jurisdictions in order to do our fair share of keeping global temperature rise to below 1.5°C. This considers Nova Scotia's fair share of reductions, based on the internationally agreed upon understanding that all jurisdictions have "...common but

differentiated responsibilities" based on economic ability, current emissions and historic emissions. "

This would mean that item 6a would read:
6 The Government's targets for greenhouse gas emissions reductions are
(a) by 2030, to be at least **58**% below the levels that were emitted in 2005

This concludes my recommendations regarding GHG target improvement. Now to discuss the fossil fuel phase out: António Guterres, the UN secretary general said in response to the report: "This report must sound a death knell for coal and fossil fuels, before they destroy our planet. If we combine forces now, we can avert climate catastrophe. But, as the report makes clear, there is no time for delay and no room for excuses."

Therefore, Bill 57 must have stronger targets in relation to phasing out of fossil fuels. A recent report from Efficiency Canada found that 47% of Nova Scotia's greenhouse gas emissions come from our buildings. Therefore, a good way to reduce our greenhouse gases and reduce our reliance on fossil fuels would be to create a strong efficiency policy.

I recommend that 7b be changed to read:
"to strengthen energy efficiency programs so that
all new public and non-profit homes will be net zero energy ready and have electric or zero carbon heating systems;
all existing public and non-profit homes will have deep energy retrofits and electric or zero carbon heating systems by 2030;
all homes owned by low and modest income homeowners or rented to low and modest income households, will have deep energy retrofits and electric or zero carbon heating systems installed by 2030 with 50% completed by 2026
2.5% of all existing homes will have net zero energy retrofits per year by 2030; and
ownership documentation will not be a barrier to meeting these targets in in African Nova Scotian communities"

I recommend that goal 7e be changed to read:
"to adopt the 2020 National Energy Code for Buildings and the National Building Code within 18 months of their being published by the Government of Canada and to require all new residential buildings to be net zero energy ready and to have electric or zero carbon heating starting no later than 2025;"

Finally, I recommend that environmental racism be included in Bill 57. Dr Ingrid Waldron has done extensive research on this topic. Her research in Nova Scotia has lead the way in Canada and North America. It is a disservice to her and racialized communities facing systemic disctriminiation that the phrase "environmental racism" is not in this bill. I recommend that Section 17 read:

17 The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities to create a sustained funding opportunity for climate change action and support for **community-based solutions, policy engagement and elimination of environmental racism**."

Appendix 1:

PART III
COMMISSIONER OF THE ENVIRONMENT, REPORTS, ETC.
Auditor General
49 (1) The Auditor General may exercise the powers and shall perform the duties and functions assigned to him or her under this Act. 2018, c. 17, Sched. 15, s. 6.

Same
(2) Every power possessed by the Auditor General in carrying out his or her functions and responsibilities under the Auditor General Act, and every duty to comply with the exercise of such a power, is also a power and duty under this Act, subject to any necessary modification. 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Commissioner of the Environment
50 (1) The Auditor General shall appoint a Commissioner of the Environment who shall be an employee of the Office of the Auditor General. 2018, c. 17, Sched. 15, s. 6.

Duties
(2) The Commissioner of the Environment shall exercise the powers and perform the duties delegated to the Commissioner by the Auditor General under this Act. 2018, c. 17, Sched. 15, s. 6.

Absence
(3) If the Commissioner of the Environment is absent or unable to fulfil his or her duties, the Auditor General may designate in writing an employee of the Office of the Auditor General to fulfil those duties. 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Reports
51 (1) The Auditor General shall report annually to the Speaker of the Assembly with regard to the operation of this Act, and the Speaker shall lay the report before the Assembly as soon as reasonably possible. 2018, c. 17, Sched. 15, s. 6.

Same
(2) The annual report may include,

(a) a review of progress on activities to promote energy conservation;

(b) a review of progress on activities to reduce greenhouse gas emissions; and

(c) any matters that the Auditor General considers appropriate. 2018, c. 17, Sched. 15, s. 6.

Same

(3) The annual report may, in the Auditor General's discretion, be included in the Auditor General's annual report prepared under section 12 of the Auditor General Act. 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Employees continued
52 (1) The employees who work in the office of the Environmental Commissioner immediately before the day section 6 of Schedule 15 to the Restoring Trust, Transparency and Accountability Act, 2018 comes into force and who are offered and accept employment with the Office of the Auditor General shall continue to be employed on such terms as may be determined under section 20 of the Auditor General Act. 2018, c. 17, Sched. 15, s. 6.

Same
(2) The employment of the employees described in subsection (1) is not terminated or severed, including for the purposes of the Employment Standards Act, 2000, and the employment of the employees immediately before and after the day section 6 of Schedule 15 to the Restoring Trust, Transparency and Accountability Act, 2018 comes into force is continuous for the purposes of calculating an employee's length or period of employment. 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Transfers
53 (1) Subject to subsection (2), the rights, obligations, assets and liabilities relating to the office of the Environmental Commissioner, as they exist immediately before the day section 6 of Schedule 15 to the Restoring Trust, Transparency and Accountability Act, 2018 comes into force, become rights, obligations, assets and liabilities relating to the Office of the Auditor General on that day. 2018, c. 17, Sched. 15, s. 6.

Exception
(2) Subsection (1) does not apply in respect of the rights, obligations, assets or liabilities relating to the employees who work in the office of the Environmental Commissioner immediately before the day section 6 of Schedule 15 to the Restoring Trust, Transparency and Accountability Act, 2018 comes into force. 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Non-application of successor rights and sale of business rules
54 Any rules respecting successor rights or the sale of a business set out in the Crown Employees Collective Bargaining Act, 1993, including but not limited to section 10 of that Act, and the Labour Relations Act, 1995, including but not limited to section 69 of that Act, do not apply with respect to the transfer described in subsection 53 (1). 2018, c. 17, Sched. 15, s. 6.

Section Amendments with date in force (d/m/y)

Protection from liability

55 (1) No cause of action arises, no proceeding may be brought and no remedy is available or damages, costs or compensation payable in connection with any amendment made by Schedule 15 to the Restoring Trust, Transparency and Accountability Act, 2018 to this Act or anything done or not done in accordance with those amendments. 2018, c. 17, Sched. 15, s. 6.

Same
(2) Subsection (1) applies whether the cause of action on which a proceeding is based arose before or after the day that subsection comes into force. 2018, c. 17, Sched. 15, s. 6.

Proceedings set aside
(3) Any proceeding referred to in subsection (1) commenced before the day that subsection comes into force is deemed to have been dismissed, without costs, on that day. 2018, c. 17, Sched. 15, s. 6.

Bill 57 – Environmental Goals and Climate Change Reduction Act

Submission to Law Amendments Committee
Donna Crossland MScF, Vice President Nature Nova Scotia
Annapolis County – October 31, 2021

Nature Nova Scotia member organizations represent > 10,000 citizens: *Annapolis Royal and Area Environment and Ecology Group: Annapolis Waterkeepers : Blomidon Naturalists Society : Cape Breton Naturalists Society : Eastern Shore Forest Watch Association : Friends of Antigonish Harbour : Friends of Nature : Friends of the Pugwash Estuary : Halifax Field Naturalists : Margaree Environmental Association : Nova Scotia Bird Society : Nova Scotia Wild Flora Society : Save Caribou : Stop Clearcutting Unama'ki : Stop Spraying and Clear-cutting Nova Scotia: Tusket River Environmental Protection Association : Young Naturalists Club of Nova Scotia*

Introduction

The Environmental Goals and Climate Change Reductions Act (EGCCRA) is significant and essential environmental legislation required to address the climate change emergency as well as to protect the natural world; our environment that sustains both us and all living things. Recognizing that many of our daily actions and management policies presently *contribute* rather than mitigate the climate change emergency, it is appropriate to implement bold new environmental goals with set timelines to rapidly alter course.

This legislation can greatly assist us with some of the biggest emission issues that contribute to the climate emergency. Bill 57 represents an improvement over the preceding government's Sustainable Development and Goals Act. However, some additional amendments are required to successfully mitigate damage to the natural world and reduce climatic warming. This submission focuses particularly on forest resources and 'nature-based' climate solutions. Some timelines must be moved up, or they shall lead to failure on reducing carbon emissions and will seriously handicap our ability to conduct ecological forestry in both the short and long-term. We need to act *now*, based on a firm, science-based platform, and using some recent evidence that is extremely important but may not be widely known or understood. The legislation should reflect growing public concern over dwindling forest resources that are a key part of climate mitigation the biodiversity crisis.

Some additional factors need to be addressed and integrated into Bill 57, such as; 1) inappropriate use of forest resources for biomass-generated/falsely-labelled green electricity; 2) the increased realization that forest resources need to remain intact and allowed to grow older wherever possible in order to help mitigate the climate crisis.

The remainder of our focus is directed toward Section 10, which sets out Government's goals with respect to protected lands, ecological forestry, and land use planning.

10 The Government's goals with respect to the protection of land are

(a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

(b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;

(c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" prepared by William Lahey in 2018, through the triad model of forest management that prioritizes the sustainability of ecosystems and biodiversity in the Province; and

(d) to identify by 2023 the percentage allocation of Crown land dedicated to each pillar of the triad model of forest management referred to in clause (c).

Problem statement: Bill 57 will not curb Carbon emissions without addressing the amendments outlined in bold in this submission. Much of the Nova Scotia landscape has become carbon-emitting in recent years, thereby adding to the climate change crisis, stemming from continued clearcutting and degradation to lands that might otherwise have been allocated to protected areas or matrix land for ecological forestry. We suggest carefully reviewing updated satellite images of NS submitted in Appendix A that show pink areas that can be regarded as mainly carbon-emitting landscapes. Those lands shall remain damaged for centuries and are rendered immediately unusable for either of the two pillars of the TRIAD, i.e., protected areas or matrix lands for ecological forestry. Land use planning was recommended by Lahey but has been unnecessarily delayed, leading one to surmise that the delay was purposeful to allow more time for aggressive cutting valuable forest resources to the detriment of the environment and climate change.

Post-clearcut landscapes alter forests from carbon sequestering to carbon-emitting. Bill 57 allows for more clearcutting to occur until 2023 with increased carbon emissions continuing to emanate from post-clearcut lands for years afterward. Delays indicated in this Bill for implementing ecological forestry further exacerbates climate change and the biodiversity crisis. Avoidance in addressing the clear connection between clearcutting and climate change will result in heating up both the planet and public anger. Members of Nature NS and other Nova Scotians grow weary and mistrustful from unnecessary further delay that continues to damage our natural world.

Suggestions and Amendments:

We suggest several amendments to Section 7 goals for climate change mitigation and reduction of greenhouse gas emissions.

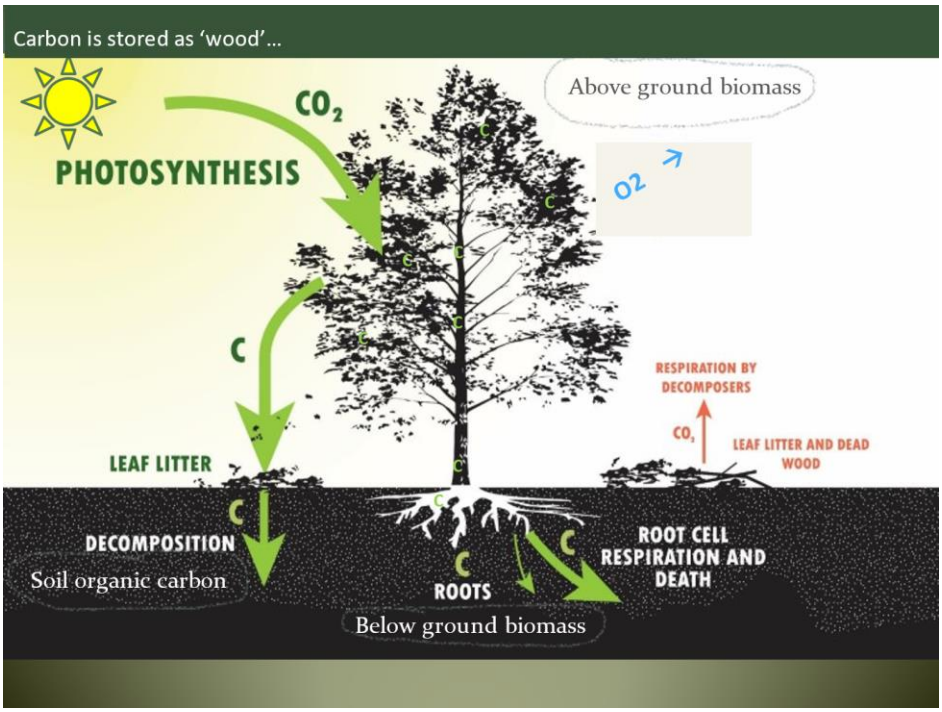
1) **Amendment Sect 7 – Reduce forest cover losses in recognition that maintaining forested environments is a 'nature-based climate solution' that greatly aids the earth's natural capacity to sequester carbon and heal itself against climate change.**

Forest ecosystems naturally sequester large amounts of greenhouse gases (i.e., atmospheric CO2), helping to mitigate climate change. The tree can be regarded as a 'natural climate solution'. Yet in Nova Scotia we are cutting trees down faster than they grow back at a time when we need them more than ever to counter climate change.

Maintaining forest cover is one of the most cost-effective ways to address the climate emergency. Knowing how forests store/release carbon is of great utility to Committee members and may serve to improve Bill 57.

But many of us have never learned the connection between forest cover losses and the way this contributes to global warming. This is not our fault, and as a former high school science teacher, I strongly urge this subject be added to our science curriculum- "Carbon" as a Carbon dioxide gas (CO2) is rather nebulous, and more formal learning helps us understand how it gets into trees. I understand that you may have a handout of some slides I prepared and can see what I am referring to on slide # 3 so I will rapidly walk you through it (*with a short test at the end*).

Trees absorb CO2, a greenhouse gas, through the process of photosynthesis where the Carbon (C) atom is broken away from the CO2 molecule and is incorporated into the tree where it becomes "wood" and other plant tissues. Wood is essentially 'sequestered carbon' converted from the gas form into its solid form; a miraculous outcome of photosynthesis! (*The trees also produce oxygen as a by-product of photosynthesis, which we humans and other animals find life-sustaining*.)



But there's even more to be excited about with this nature-based solution: The ability of our forests to sequester carbon *below ground* can make up to roughly 60 % of forest carbon stores. In other words, half or more of forest carbon stores exist underground, in roots and soil carbon from decaying plant matter. The critical step that I hope everyone understands is that a total removal of the forest overstory

exposes forest soils and result in the release of vast carbon stores in the soil as the soil heats up in hot, dry clearcuts. In other words, clearcut logging doesn't just impact the vegetation but also undermines the integrity of soil health and the soil carbon vault.

Furthermore, while the trees regrow, the forest takes a long time before it returns to being a *net absorber* of carbon. **The solution to reducing CO2 emissions is to keep underground carbon stores *in situ* by maintaining FOREST COVER.** To be clear, we can still harvest forests, but maintaining natural forest cover is a goal in ecological forestry.

Throughout NS, unsustainable clearcutting of public forests has continued unabated, despite years of focus on the damage incurred to the Acadian forest, which is not adapted to clearcutting, and enormous public outcry. Presently, almost no old forests remain above 80 years old on the landscape, despite older forests having higher carbon storage capacity.

Over-harvesting has attributed to the loss of older forests, which store the most carbon. The age class of our Nova Scotia forests has become increasingly younger and has less capacity to store carbon. We now recognize how this has caused additional releases of excessive greenhouse gases from the soil. It is no longer acceptable practice, given modern carbon science.

In addition to the suggestion of addressing the use of natural forest cover to combat the climate crisis, this approach would have significant, long-term benefits for biodiversity; deemed part of the "twin crisis" along with climate change.

2.) **Amendment Sect 7- Identify that maintaining forest cover as part of a natural climate solution is a means to also benefit <u>biodiversity</u> which is in decline.** It may be considered an oversight to have an "environmental goals" bill that refers to *biodiversity* only once throughout the Bill, only under 10 (c) where it was prioritized by Bill Lahey. Roughly half of Nova Scotia forests have been clear-cut in the past 35 years. Mature forests and their habitats are essential for the survival of many wild species but are rapidly disappearing. Nature is resilient, but we've been taking too much, too fast, for too long. The bill might also consider an acknowledgment that restoration of healthy ecosystems is a reasonable environmental goal for many locations before they are degraded beyond critical thresholds. Global biodiversity is in crisis. The list of NS species at risk is growing, and there has been negligence to properly address the management of many of those species, such as the endangered mainland moose that continues to have its forest habitat degraded for profit.

The introduction of invasive species will cause additional and even greater losses of biodiversity over this decade. These biodiversity losses will also be notable in protected areas that are poised to lose forest foundation species of eastern hemlock, and American beech, as well as ash trees. These are temperate tree species that would have remained suitable to the new climatic conditions and provided habitat for many other forest species.

All in all, the unprecedented, widespread mortality of such tree species present more reasons to tread lightly on our forest resources. With this realization comes a renewed examination of Section 10 (a)- and the question may arise whether 20 % protected areas is sufficient. Many of

these areas will be highly degraded and will not perform the ecosystem services (e.g., filtering clean air and water) as they would normally do. With the unprecedented high levels of old growth mortality expected to ensue from invasive forest species, carbon sequestration will be compromised and may become carbon- emitting despite not being cut down. Yikes! How do these factors build a climate resilient Province?

3.) **Amendment: Biomass for electricity generation and export for biomass energy abroad will be halted by 2022, with biomass removed from the list of renewable energy sources.**

Section 7 (l) provided a goal to have 80 % of electricity production supplied by renewable energy by 2030. This sounds good in principle but burning forest biomass must not be a part of this goal. Biomass for electricity is dirtier than coal and cannot be considered as "green energy". **This Bill must remove forest biomass from the list of renewable energy sources.** A commitment to reject biomass for electricity – both for domestic and export consumption is required. Burning our dwindling forest resources that are needed for higher uses such as carbon sequestration and other ecosystem services, as well as wildlife habitat, to produce electricity is tremendously wasteful and more polluting than coal. The entire biomass industry for electricity generation is built upon erroneous assumptions. (It is unclear in this Bill whether Government will continue to erroneously consider biomass as a clean and renewable energy resource.

Committee members are encouraged to view the documentary "Burned" for a more fulsome realization of the need for an environmental goal regarding biomass for electricity. Bill 57 must acknowledge the science and true carbon accounting that renders it extremely clear that we cannot not burn our forests for 'green electricity' production. Furthermore, our forest soils contain insufficient nutrients to allow exports of wood chips to carbon-emitting end-uses internationally. It's time to 'do the right thing'. To be clear, wood heating which uses forest biomass, is a different topic that entails far more efficient combustion levels, making it acceptable to use biomass for small wood heating facilities from ecological-harvests. We recognize that this 'in-house' end use of wood products remains acceptable and assists ecological forestry markets.

4**.) Amendment: Conduct proper forest carbon accounting so that climate goals are accurately set and attained.**

A recent report by the NRDC makes it clear that the Government of Canada's current accounting practices for forest carbon included some loopholes and that have severely under-reported forestry carbon emissions (Skene and Polanyi 2021). Forestry can no longer 'fake it on the books' with regards to full reporting of carbon effects from forestry activities. From this, it was concluded that the contribution of forests to meeting 2030 carbon emissions target is significantly overstated.

More accurate carbon accounting will soon be adopted that reveals the full carbon-emitting outcomes of clearcut logging (Skene and Polanyi 2021). **It is prudent in Bill 57 to begin accurate and full carbon accounting now**. Missteps in using traditional forest carbon accounting

loopholes will not only continue to increase our emissions and threaten our ecosystems, but will result in a Government that appears out-dated while passing a brand new Act. The logging industry no longer merits a 'free pass' on carbon emission accounting following biomass and clearcuts.

5.) **Amendment on 10 (c) to implement the Lahey Report recommendations within <u>2022</u>**.

Another 2-year delay is wholly unacceptable after the nearly 3 year wait time already observed to implement real forest change on the ground. Ecological forestry is needed *now,* and further delay serves to further damage our climate change and biodiversity crises.

I was personally involved in the Natural Resources Strategy in 2009-10, along with our Nature NS President, Bob Bancroft. We witnessed first-hand the strategic delays that favoured the forest industry over the environment, and ultimately led to failure to implement the new forestry strategy. I fear repetition of the same mistakes again with the delays observed. Delays are no longer justifiable since we already know how to conduct ecological forestry, practitioners of ecological forestry exist, and the revised silvicultural guides are ready to go. DNRR referred to them as 'living documents' that can be continually revised. Industry and closely-tied Government officials can devise many reasons for why ecological forestry cannot begin, but in truth we are ready and could begin tomorrow. An interim measure to get us started might be to remove no more than 30 % in any single forest harvest entry. There are many ways to incentivise getting ecological forestry underway without more delays.

Furthermore, given the depth and breadth of the Lahey recommendations, Bill 57 is surprisingly devoid of details on its implementation. Additional details are appropriate to include.

Stemming from widespread public frustration over lack of ecological forestry implementation, Nature Nova Scotia requested a full moratorium on all clearcutting on Crown land until ecological forestry is ready to be actioned on the ground. Similarly, there were two additional requests for a clearcutting moratorium until ecological forestry was implemented on Crown land: from the majority of members of the *Ministers Advisory Committee on the implementation of Lahey,* and the Healthy Forest Coalition (HFC). All three requests were ignored by the preceding Government, but public sentiment has not waivered.

6.) **Amend 10 (d) so that land use planning assigns Crown lands dedicated to each pillar of the TRIAD model of LAND management (*not "forest" management*) by <u>2022</u>.**

This amendment is required because the TRIAD system includes protected areas and thus is a way of assigning a full range of Crown land activities, of which forestry is just one of them. (This is also reflected in the updated Crown Lands Act.)

Updates on land use planning have not been forthcoming, though some maps exist for landscape designations of the three land use pillars. Furthermore there is a lack of collaboration between the two government departments that oversee the TRIAD system, with the Department of Environment and Climate Change absent from the Minister's Advisory Committee. Land use planning must be completed *now*, rather than 2023. This becomes obvious when we examine two of the TRIAD designations. The majority of matrix forests are at

risk of being clearcut with the proposed delays, rendering them no longer suitable for ecological forestry nor protected areas. The delay may be regarded to cater to 'High Production Forestry' (HPF) or plantation forestry.

Furthermore, a western Crown lands planning process was recommended by Lahey, with most citizens having long-since recognised that the WestFor model is only working for the interests of mill owners. **Bill 57 must address without further delay a land use planning before the range of management possibilities are severely limited and lands are further damaged with great risk to other forest components**.

Plantation conversions, or HPF lands are one of the pillars of the TRIAD and are being touted by industry. The NRDC report indicates that plantations sequester only a fraction of the carbon of naturally regenerated forests (Skene and Polanyi 2021). Nature NS continues to be concerned with potential public expenditures on plantation forestry, the extent of plantations which negatively impact wildlife habitat, and we are against any new forest conversions given that existing plantations should be utilized to begin the Lahey implementation of this pillar.

We did not focus on technological fixes for climate warming, such as purchasing electric vehicles, or retrofits for rendering buildings to be net zero energy consumption, although they remain worthy endeavours.

Conclusion

Nature Nova Scotia suggests a more strategic commencement of this new legislation that recognizes nature-based climate solutions found in forests and other natural systems which have an enormous ability to address the buildup of greenhouse gases. They bring added benefits and synergies that address biodiversity loss, wildlife habitat loss, and wide-ranging environmental requirements. We recommend that the amendments we've outlined be considered to: (1) provide greater consistency with the spirit and intent of the Lahey Report and meet expectation of a growing public discontent with lack of action to implement Lahey recommendations; (2) minimize carbon emissions through an immediate halt to clearcutting as requested by NNS, HFC, and the Minister's Advisory Committee (majority members request); (3) promote a collaborative land use planning approach for Nova Scotia's Crown lands and protected areas.

Respectfully submitted,

Donna Crossland MScF, VP Nature Nova Scotia

References:

Skene, J. and M. Polanyi. 2021. Missing the forest: How carbon loopholes hinder Canada's climate leadership. NRDC. R: 21-10-J

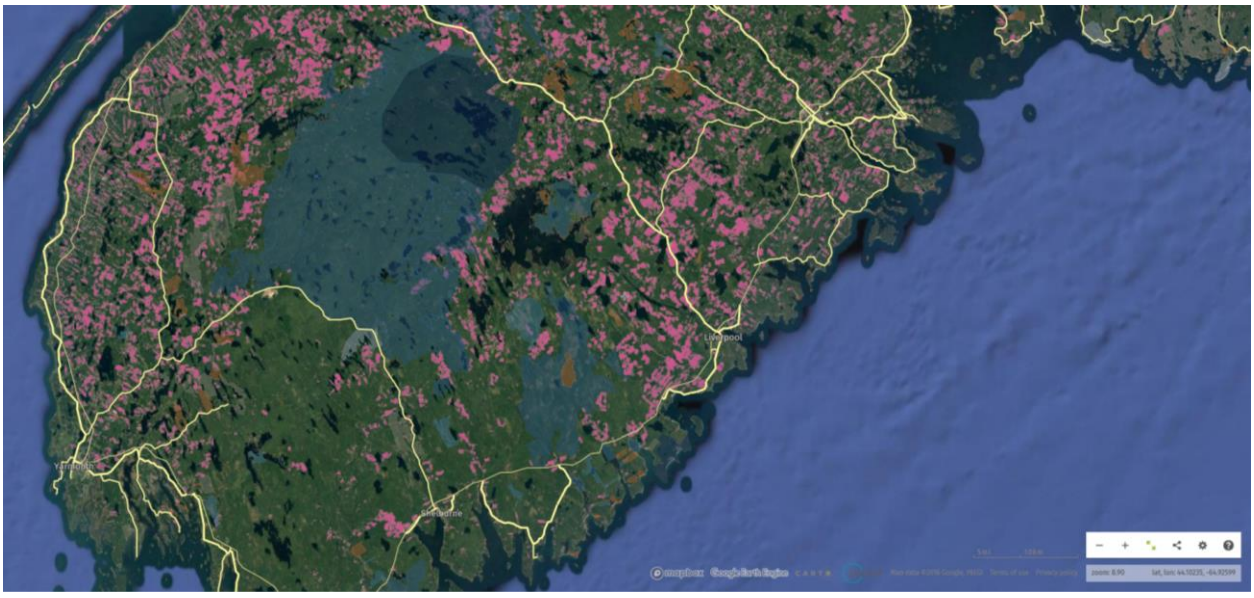
Suggested documentary:

Are trees the new coal? Malboro Productions

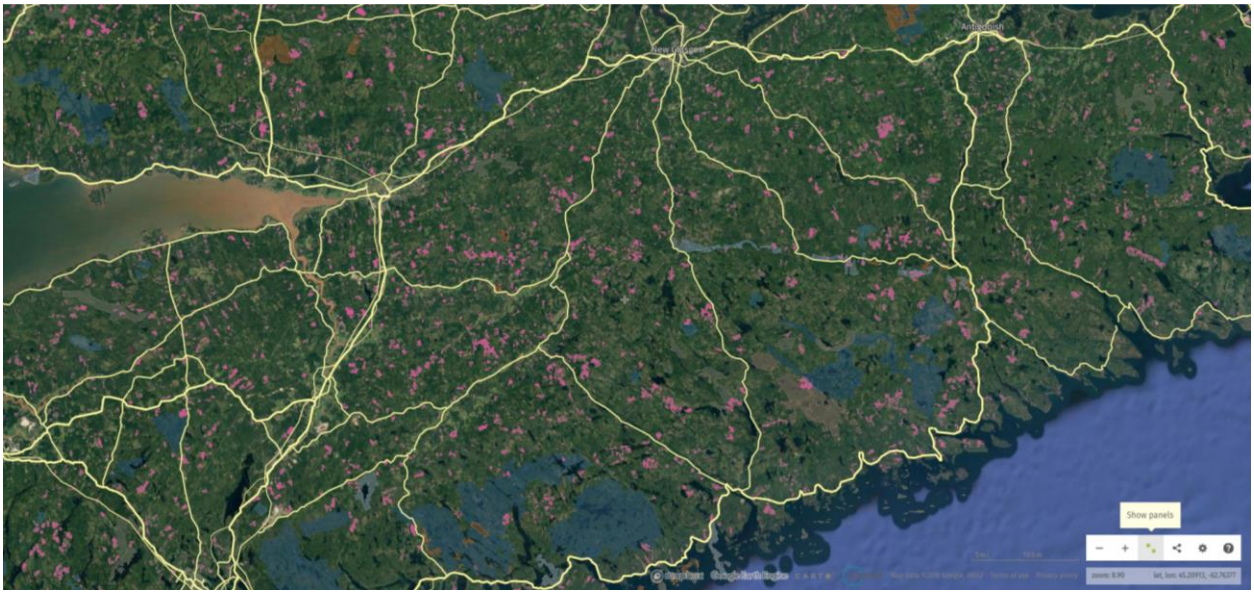
Appendix A

Forest Cover Losses during 20 years in NS that resulted in increased Carbon emissions. Pink polygons are satellite-interpreted forest cover losses. (Source Global Forest Watch)

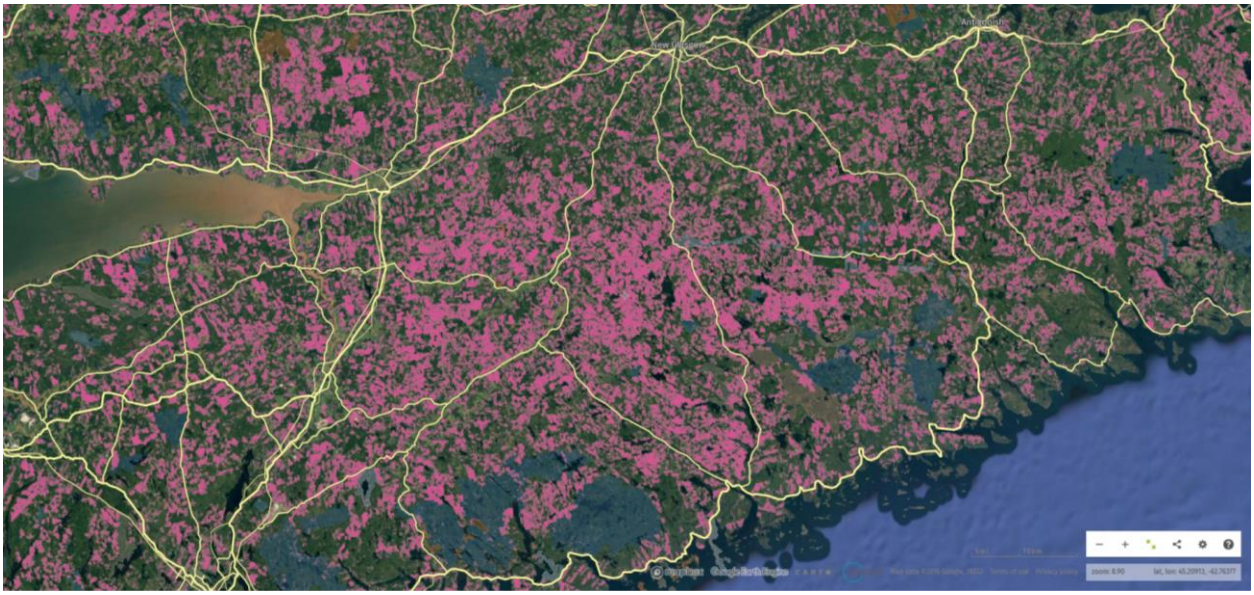
2000



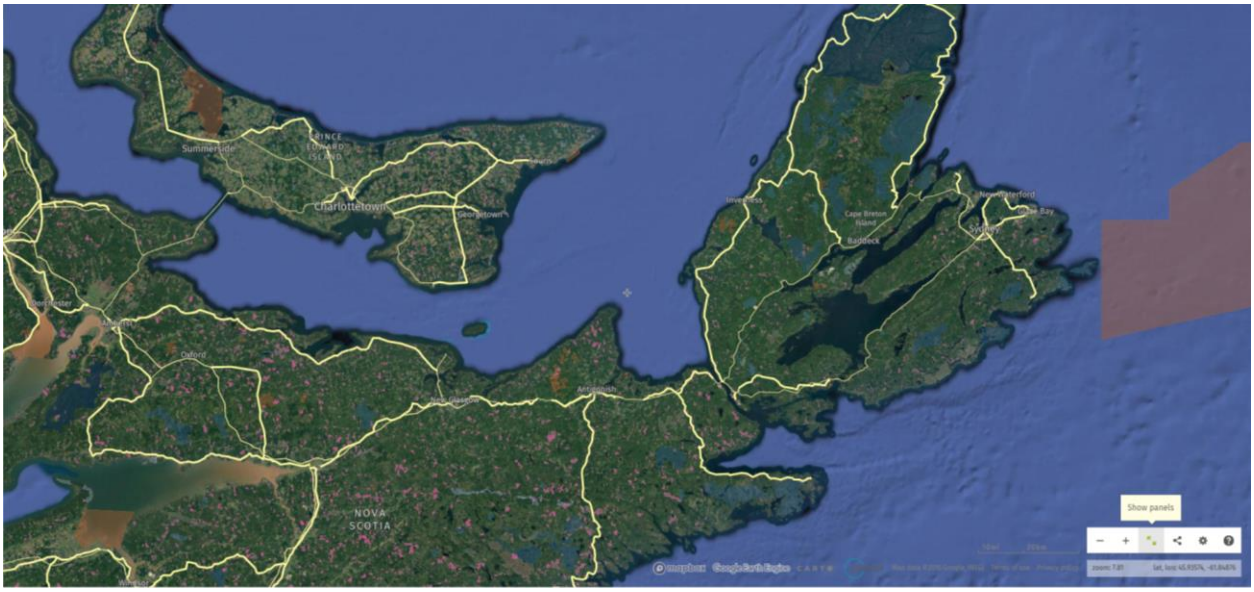
2020



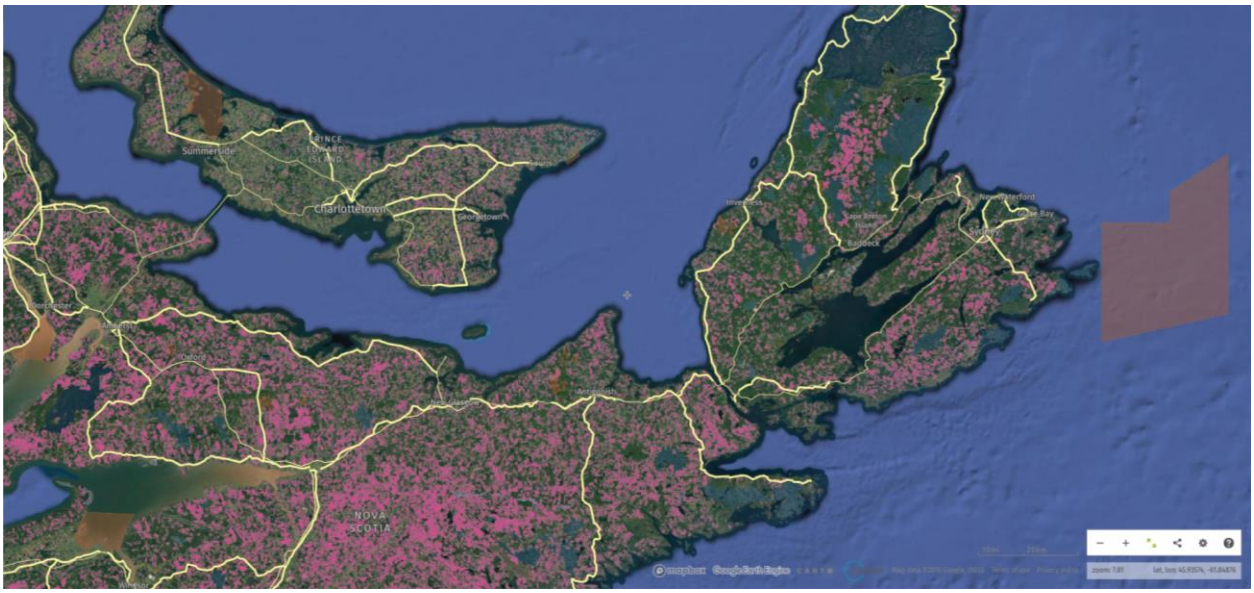
2000



2020


Summerside
Charlottetown
Georgetown
Cape Breton Island
Baddeck
Oxford
NOVA SCOTIA
Show panels

2000


Summerside
Charlottetown
Georgetown
Cape Breton Island
Baddeck
Oxford
NOVA SCOTIA

2020

Law Amendments Submission
Bill 57: Environmental Goals and Climate Change Reduction Act

Submission by Bonnie Sutherland, Nova Scotia Nature Trust Executive Director on behalf of
Nature Conservancy of Canada, the Nova Scotia Nature Trust and Sespite'tmnej Kmɨtkinu Conservancy

Nova Scotia's major land trust partners congratulate and thank the provincial government for committing to the ambitious target of protecting 20% of Nova Scotia's lands and inland waters by 2030, and to a collaborative protected areas strategy by 2023.

We would like to draw your attention to the critical role of private land conservation in meeting this commitment and to suggest how the Act, and supporting government actions, can unlock the significant capacity of conservation partners to help achieve the 20% target.

Why Private Land Conservation?

Nova Scotia has limited Crown lands, serving diverse needs and purposes. Getting to 20% on Crown land alone would be challenging.

Private lands are critical to ensuring the government truly meets the intent behind the ambitious global, national, and now provincial protected areas targets—biodiversity conservation. This work is not just about acres, it is about protecting our rich, diverse, and unique biodiversity. The quality of those acres matters. Over 65% of Nova Scotia, including over 85% of our treasured coastal lands, are in private ownership. These lands support disproportionate ecological value, from much of the critical habitat for endangered species and migratory birds to many of our last best remaining old growth forests, unique gypsum karst landscapes and rich floodplains. Private lands are essential to a protected areas system with representation of all our unique natural landscapes. Private lands are also critical to build landscape connectivity to ensure climate resilience and long-term viability for the species, habitats, natural processes and the ecosystem services upon which we depend.

Why Land Trusts?

Land trusts are non-government charities dedicated to the conservation and stewardship of ecologically important private lands, and they are an essential partner to government.

Land Trusts can secure land governments cannot. We are community-based, with a strong track-record of landowner and community education, engagement, and trust. We provide an alternative to landowners seeking a non-government partner for protecting their lands. We are nimble, flexible and can move quickly on conservation opportunities. Land Trusts leverage significant corporate, private and government funding, as well as donations of land and conservation easements—all costs government would otherwise have to pay. The new Mi'kmaw land trust provides a key tool for advancing Indigenous protected and conserved areas across Mi'kma'ki.

In so many ways our role is complementary and essential to government in achieving its environmental and conservation goals.

We are long-time trusted partners to the province. In recent years we have come together in unprecedented collaboration with the province, land trusts, Indigenous partners, federal and municipal governments, and other partners. We are all keen to step up even more.

Recommendations for the Act

Private land conservation is a critical tool in meeting the 20% commitment by 2030. But creative, new ways of thinking and doing business, policy levers and government investment are needed to maximize the potential and impact of private land conservation.

We recommend enshrining this recognition in the Act, by adding a clause under Section 10a,"*to support the goal in clause 10(a) with policy levers, incentives and investment to accelerate and support private land conservation."*

Priority Actions to Unlock the Power of Private Land Conservation

While there are many ways to accelerate and support private land conservation to play a significant role in reaching 20%, two emerge as highest priority.

1. Recapitalize the Nova Scotia Crown Land Legacy Trust

Since its founding by the provincial government in 2008, the $23 million Nova Scotia Crown Share Land Legacy Trust has been transformative for private land conservation, advancing the pace and scale of conservation exponentially.

The Land Legacy Trust has invested $17 million to date in land trusts to protect priority conservation lands across Nova Scotia. Land Trusts have leveraged $38 million in land conservation projects, resulting in a 300% return on the provincial investment.

Land Trusts have an unprecedented opportunity to increase our collective impact even more, with our ability to access the federal government's historic investment in biodiversity conservation and nature-based solutions to climate change, incredible public support for conservation, the emergence of new land trusts, and well-advanced and effective conservation collaborations.

The fund, however, is nearing its end. Without the Land Legacy Trust, land trusts lose an irreplaceable and essential conservation tool. Without it, land trusts will not be able to contribute significantly to the 20% commitment.

The province will lose out on 8 years of significant federal dollars that land trusts could bring to Nova Scotia, and lose out on three times that federal investment in fundraised dollars and land that land trusts could leverage. Finally, the Province would lose the unique capacity of land trusts

to deliver otherwise unachievable biodiversity conservation results, ensuring ecologically rich, diverse, and threatened private lands are included in the 2030 parks and protected areas system.

Extending and replenishing the Land Legacy Trust, providing an additional $50 million in funding through immediate recapitalization (at least $30 million), and the creation of ongoing funding mechanisms to build and sustain the fund, is critical to accelerate and amplify private land conservation impacts. Many other jurisdictions in Canada are making similar major investments in private land conservation.

2. Remove the Mineral Rights Impediment to Private Land Conservation

Land trust protected areas are not afforded the same protection from mineral development as Nature Reserves and Wilderness Areas. This inconsistency in provincial policy puts biodiversity at risk. It creates a barrier to private land conservation as some landowners fear the mining risk, and land trusts' inability to ensure protection from mining. The potential risk means that land trust protected areas may not be counted in national reporting on protected areas/biodiversity results (protected areas must meet International Union for the Conservation of Nature land conservation standards).

While the mining threat has long been problematic for land trusts, now, with the opportunity of a lifetime to meet an incredibly bold and ambitious biodiversity conservation target in Nova Scotia, the time is right for creative solutions, and for all departments and community partners to work together to remove this significant barrier to private land conservation. Again, if not resolved, even more of the 20% would need to come from Crown lands and almost all the funding for conservation from the Provincial government.

3. Other Key Government Actions Required

1. Continuation of the Conservation Property Tax Incentive
2. Sustaining provincial support and engagement in a collaborative conservation model with land trusts, all levels of government, Indigenous and other conservation partners.
3. Sizeable tangible capital asset budget for NSECC Protected Areas until 2030, with flexibility for creative partnerships/collaborations
4. New tools, incentives, and ways of doing business to accelerate and enhance private land conservation

Urgency

The government must replenish the Land Legacy Trust and enact key policy levers and incentives as soon as possible. We have only 8 years to reach 20%. Private land conservation can take time, sometimes several years, especially to leverage significant and cost-effective land donations and conservation easements. The more time we have, the greater chance of private land conservation success, and greater assurance of reaching 20%, and doing so with 'the *right* lands.'

We also only have eight or less years of the current Federal Government conservation funding windfall. We have municipal, corporate, foundation and private funding that land trusts could leverage right now, while momentum for conservation action and inspiration to help make it happen are both at an all-time high. We have landowners inspired to be a part of the 20% target, keen to protect nature on their lands. Every year delayed means even less funding to accomplish 20%, less private land conservation possible, and more demand on Crown lands to meet that target.

Finally, there is opportunity cost. With real estate booming, developments changing lakeshores, coastlines, and forests at an accelerating pace, we are losing opportunities every day to protect the most ecologically significant natural areas. With land prices escalating, delaying action increases the cost of conservation.

Private Land Conservation Partners Ready to Deliver

Nova Scotia's major land trusts are keen to continue working collaboratively with government and other partners to deliver the private land conservation needed to help meet the 20% commitment, and to protect the best and most threatened of Nova Scotia's biodiversity.

We respectfully encourage the Government to include reference to private land conservation in the Act, and to put the necessary investment, collaboration, policy levers, and other tools and incentives in place to unlock the full conservation power, momentum, and public support of your private land conservation partners.

Contact: Bonnie Sutherland
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Council of Canadians' presentation to NS Law Amendments, on
Bill 57 – The Environmental Goals and Climate Change Reduction Act (EGCCRA)
01Nov2021, 9:50pm

Territorial acknowledgement

I'd like to give deep thanks to Elder Marshall for speaking to this committee about two-eyed seeing, which is such an important part of this bill. I stand in solidarity with protection of the unceded and unsurrendered lands of Mi'kma'ki, where most if not all of us call home. From my work with the Grassroots Grandmothers and other Indigenous water protectors and land defenders, I continue to learn about the importance of treaty and how to be a better ally. This comes with a decision to always prioritize the land and water over corporate interests, and a realization that in order for the planet to survive, we need to do a deep reassess of our colonial ways.

I know it's been a long day for many of you, hearing from many people on this bill and others! I appreciate being added to the list of speakers after a cancellation gave me this space, and I'll send along my comments to Legislative Council after I finish here.

I'm the Atlantic Regional Organizer with The Council of Canadians, a social justice advocacy organization that works to build power in communities. I've been privileged to support movements to Stop Alton Gas, fracking, uranium mining, the Energy East pipeline, Northern Pulp, and so on. We continue to work with communities and allied organizations to ensure no offshore drilling happens. However, this work often feels very piecemeal, and I'll speak more to this shortly.

Our organization is held together by the shared belief that another world is possible – one where we take care of each other and the planet we live on, and where people and communities are afforded more rights and respect than corporations and the super-wealthy.

It is with that belief that I speak to you today. We are in a climate crisis. This crisis is an unfortunately logical conclusion of centuries of colonization of Indigenous lands, and the oppression and abuse of the world's Indigenous peoples - here in Nova Scotia the Mi'kmaq Nation. This colonization of land and people enabled the accumulation of wealth by a few, as a result of taking the wealth of many. In the past few decades corporations have amassed incredible wealth and have paid for access to innumerable government decision making processes and public forums, including those that are meant to address the climate crisis. This is the root of the climate crisis, and we cannot forget that as we make this bill. This is a crisis of inequality, wealth accumulation, and political power that is now manifesting as climate change.

We need to collectively transform society – from the extreme inequality and disconnection from the very real ecological crisis we are experiencing today, to a society that prioritizes people's health, wellbeing, community, and dignity, and recognizes that people and the planet are inseparable.

I've been watching presentations throughout the day as I've been able, and want to second many of the points raised by several other speakers which reflect our perspective on Bill 57 – The Sierra Club Canada Foundation, the Ecology Action Centre, the Climate Emergency Unit, ECLAW, Healthy Bays Coalition, Canadian Federation of Students NS, and on.

To this, I'd like to be transparent that we have not had the time to do a full analysis of the bill and dive deeply to propose specific language amendments, so trust you will reflect on proposals already made by the groups I've listed and others who spoke to environmental racism and equity points, along with emission reduction targets, coal phase-out, and the need for a better framework around external accountability.

We too generally support the spirit and intent of this bill, and feel strongly that the climate crisis truly needs to be treated as such – a crisis, as with the COVID pandemic – and that now is the time to move towards a just transition. A crisis requires up-to-date data collection and communication. A crisis requires research and advice from experts in the field to tackle the issue with an immediate and aggressive response. A crisis requires grassroots and communities to be part of the solution.

The Council, along with the Ecology Action Centre and the Sierra Club Canada Foundation, released polling this past June which revealed

- 85% of Nova Scotians agree that, as the province recovers from the COVID-19 pandemic, priority should be placed on moving away from fossil fuels and towards renewable energy and efficiency systems, which would include training and income support for affected workers.

- There is also agreement among 78% of people in Nova Scotia that priority should be placed on women, people of colour, Indigenous people, and other groups made vulnerable by the current economy, so they can participate in the workforce in more equitable ways.

A just transition includes an immediate and comprehensive transition away from extractive practices. It of course does not include coal, offshore drilling, mega-sponsoring of oil and gas conferences in Morocco, or frankly any fossil fuel or mineral extraction on Mi'kmaq lands, so more can and needs to be done.

The current NS government can be a leader on a just transition, like we've been a leader during the COVID crisis. And we have seen some leadership on these issues in the past, including on Northern Pulp. The government's decision to no longer allow the toxic legacy of environmental racism to continue in Boat Harbour was the right decision. Another example is fracking: with public pressure through the Wheeler consultations and report, a moratorium passed in the Nova Scotia legislature.

But too often, we see decisions to cancel fossil fuel or extractive projects in Nova Scotia not made by a sitting government, rather by corporations, and only then after significant pressure from local communities. Take Alton Gas as the latest example, and Goldboro LNG just before it. And then there is offshore drilling, where it appears no major company is interested in exploring or drilling, and 12 municipalities have passed resolutions calling on a moratorium and public inquiry. Communities want to see you pass this bill with the strong mechanisms we need to meet our climate targets and address inequality.

Relying on market forces – or corporations – won't be enough. Communities and working people have witnessed too many hollowed out communities and poverty wages jobs left behind from market booms and busts or unjust trade deals. We need a comprehensive approach that creates good green jobs and drives inclusive workforce development, led by and including affected workers and communities.

With this bill, there is opportunity to address the bigger picture instead of the piecemeal approach and I encourage you to further consider this combined with the knowledge that **we are in crisis** and that **the public supports major action**. Thank you.

Angela Giles (she/her)
Atlantic regional organizer

THE COUNCIL OF CANADIANS PEOPLE. PLANET. DEMOCRACY.

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I am thankful to live and work in *Mi'kma'ki,* the unceded ancestral territory of the Mi'kmaw people.

Nova Scotia Regional Committee

Canadian Association of Physicians for the Environment

Law Amendments Committee Submission Re Bill 57

Thank you for the opportunity to speak to you on this very important Act.

My name is Laurette Geldenhuys. I am a doctor working in the laboratory at Nova Scotia Health (NSH) and Dalhousie University, in Halifax, speaking on behalf on the Nova Scotia Regional Committee of the Canadian Association of Physicians for the Environment (CAPE NS).

https://cape.ca/about-us/

Our mandate is to promote sustainability, including by reducing waste and energy use, in NSH; and to advocate for climate action, to improve and preserve health in NS and beyond.

As physicians we are encouraged by the support the new government is showing for health care in NS.

We are particularly encouraged by much of the content of the Environmental Goals and Climate Change Reduction Act which exceeds both the previous Sustainable Development Goals Act, and the NS Conservative Party platform on climate action.

We hope that it will be swiftly passed and implemented.

We also hope that it may be strengthened by the incorporation of suggestions provided in the analysis by the Ecology Action Centre, which we carefully reviewed and fully endorse.

https://ecologyaction.ca/sites/default/files/images-documents/EGCCRA%20EAC%20Analysis_0.pdf

On September 6, 2021, 233 international medical journals including The BMJ, the Lancet, and the New England Journal of Medicine, called on governments to take 'emergency action to tackle the “catastrophic harm to health” from climate change.'

https://www.bmj.com/content/374/bmj.n2177

The leading medical journal, the Lancet, calls climate change 'the greatest global health threat facing the world in the 21st century, but' ... also ... 'the greatest opportunity to redefine the social and environmental determinants of health.'

Their most recent annual climate and health report, published in October, 2021, where 120 leading experts from 43 collaborating organizations examined 44 indicators, 'exposed an unabated rise in the health impacts of climate change, and a delayed and inconsistent response of countries around the world.' The report states that 'the

imperative is clear for accelerated action putting the health of people and planet above all else.'

https://www.thelancet.com/countdown-health-climate

In addition to positive global effects for decades to come, climate action in NS will also have immediate local health benefits.

https://cape.ca/wp-content/uploads/2019/05/Climate-Change-Toolkit-for-Health-Professionals-Updated-April-2019-2.pdf

Electricity generation and transportation are by far the two biggest contributors to NS's GHG emissions at 42% and 31% respectively, and a source of air pollution. Air pollution is one of the most significant risk factors for premature death in Canada, with 14,400 deaths annually attributable to air pollution.

Replacing coal, not with liquid natural gas or biomass, but with renewable energy sources, will not only significantly reduce our GHG emissions, but also immediately reduce illness and death from respiratory and cardiovascular disease, cancer and premature birth, and the associated burden on the health care budget; enabling resources to be diverted to other health care and social needs. This must go hand in hand with immediately ending development of fossil fuel extraction, and fossil fuel subsidies; and redirecting resources to support workers in these industries to transition to employment in the renewable energy sector.

Electrifying transportation in general, and providing green efficient public transportation in particular, will further reduce GHG emissions, air and noise pollution, and traffic congestion; and support vulnerable populations.

Increasing safe active transportation (walking and biking, instead of driving) will similarly reduce the risk of cardiovascular disease, obesity, diabetes, cancer and vehicle-related death, and improve mental health.

Supporting local food production and consumption, with an emphasis on foods of plant origin, and a healthy food program in schools will improve food security and health, particularly for children from vulnerable communities.

Preserving wilderness, and increasing access to green spaces will have a variety of health benefits. Spending time in nature has been shown to reduce stress, improve mood, reduce heart disease, high blood pressure and diabetes, improve respiratory health, and improve response to cancer therapy, and is associated with longevity.

https://www.parkprescriptions.ca/en/whynature

A survey published on September 14, 2021, in the journal Nature, asking 10,000 16- to 25-year-olds in 10 countries how they felt about climate change and government responses to it, found that most respondents were concerned about climate change, with nearly 60% saying they felt 'very worried' or 'extremely worried'. Many associated

negative emotions with climate change, using words such as ‘sad’, ‘afraid’, ‘anxious’, ‘angry’ and ‘powerless’. Overall, 45% of participants said their feelings about climate change impacted their daily lives. This is partly caused by the feeling that governments aren’t doing enough to avoid a climate catastrophe.

https://www.nature.com/articles/d41586-021-02582-8

Strong government climate action will reduce this mental health burden that NS youth are also experiencing.

Medical school curricula are increasing planetary health content to equip physicians to navigate the health effects of the climate crisis. Increasing planetary health education in all NS schools at all levels, and in public education, will improve understanding and the ability of all members of society to participate in the positive changes needed to secure and improve our futures.

Nova Scotians have a long history of heroism and resilience in the face of disaster.

On December 6, 1917, just after 9 AM on a clear winter morning, the largest ever non-atomic explosion on earth, shook the granite foundations of Halifax, killing almost 2,000, and injuring 9,000 men, women and children, in a city of just over 60,000 inhabitants. The survivors, aided by others across Canada and North America, immediately sprang into action, offering themselves, their homes and their possessions up to respond to the disaster, caring for the injured, the hungry, the homeless, and the orphaned, rebuilding Halifax with lasting improvements in housing, and founding the Canadian National Institute for the Blind.

During the COVID-19 pandemic, Nova Scotia has been a model to the world in our solidarity, resulting in some of the lowest infection and highest vaccination rates in the world, led by first the liberal and now the conservative provincial government, and public health experts, side by side.

We hope that in the climate crisis, the greatest of all threats yet to our community, and to the world, bold climate action by our government, informed by climate scientists, will be effective here in Nova Scotia, and make us an example to the world through our collective action.

The members of CAPE NS are keen to support the government’s climate action in any way we can by sharing information on the inextricable relationship between climate and health.

From: Sandy Greenberg [redacted]
Sent: October 31, 2021 11:23 PM
To: Office of the Legislative Counsel
Cc: Gary Burrill
Subject: Environmental Goals and Climate Change Reduction Act

Every effort made by the Nova Scotia government to protect our natural environment is appreciated. Please make sure that Owl's Head Provincial Park is given formal protected status and not sold for development.

Thank you,
Sandy Greenberg
[redacted]

Ecology Action Centre

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Ecology Action Centre Presentation on Bill No. 57
Environmental Goals and Climate Change Reduction Act
November 1, 2021
Marla MacLeod & Noreen Mabiza

We acknowledge that we are gathered here today on the unceded and unsurrendered territory of the Mi'kmaq people, past, present and future caretakers of this land.

I am Noreen Mabiza, Energy Coordinator at the Ecology Action Centre. I am going to speak more broadly to the bill and accountability measures and then my colleague, Marla MacLeod, Director of Programs, will speak more specifically to some of our proposed amendments.

We, the Ecology Action Centre, applaud the Environmental Goals and Climate Change Reduction Act. We are pleased to see this set of wide-ranging targets in legislation. In particular, we are happy to see a commitment to phasing out coal by 2030, the inclusion of an electric vehicle mandate, a commitment to protecting 20 per cent of the province's land and water by 2030, and a focus on equity as a core principle.

Now we need accountability, follow-through and immediate action to address the climate and biodiversity emergencies. Significant financial and human resources will need to be associated with this Act to ensure its rapid and successful implementation. We recognize that many key details will be forthcoming in the Climate Plan. It needs to be released swiftly and contain adequate ambition to ensure targets are met and exceeded.

Section 21: Ensuring strong accountability and transparency mechanisms in the Act are critical to achieving the goals and building the public's trust. We would like to see the following amendment to improve accountability: S (21) (2) that in preparing the report the Minister MUST seek advice from the roundtable. We also recommend that the Roundtable be given authority and resources to provide recommendations to the Minister in preparation for the report, and these recommendations will be publicly available. The Roundtable, or those conducting the external review, should be provided with resources, data, and expertise needed to provide a proper assessment of progress on the Act.

In addition to the legislated 2030 and 2050 goals, interim targets must be set (i.e., 2025, 2035, 2040, 2045). The years leading up to 2030 are where we need to see the steepest reductions in emissions. If we do not meet the targets leading up to 2030, we will not be able to mitigate 1.5 degrees of warming. The importance therefore of meeting the 2030 target cannot be

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overstated, and we must ensure that robust interim targets and accountability measures are in place to ensure that we are on a pathway for emission reduction.

We are also pleased to see the inclusion of annual progress reports for the Climate plan in Section 8, as these are essential to transparency, accountability and achievement of the targets. Comprehensive progress reports would include: assessments and recommendations, not simply reporting; relevant data; clear articulation of the trajectory toward meeting the targets; explanations of why targets aren't being met (if that's the case) and plans to address any shortcomings.

We also see some key areas that are weak or missing. We need to ensure we're not undermining our own progress by continuing with outdated industries, fossil fuel extraction and relying on unproven carbon capture technologies. Missteps here will continue to increase our emissions and threaten our ecosystems.

In particular, the EAC would like to see the government commit to end all subsidies, supports and development of fossil fuels in Nova Scotia and Nova Scotia's offshore and invest in policies and programs to support oil and gas workers and affected communities transition to a low-carbon economy so as to ensure no one is left behind. We recommend the inclusion of a goal to prohibit all new offshore oil and gas activity as of January 1, 2022, and to phase out all offshore oil and gas activity by January 1, 2025.

We also request the government remove biomass from the Renewable Electricity Regulations, stop counting the burning of biomass as "carbon neutral" or zero carbon emitting (it's not), and ban the use of forest biomass for domestic and foreign export energy generation.

In our written submission, you will find our detailed analysis of the goals in the Act, as well as a list of key issues that are not addressed in this Act, which should be considered for inclusion. While we will not go into this document in detail, we would like to call your attention to the following:

Section 6: We applaud a 53% target, which is the most ambitious climate target in Canada; however, we acknowledge that a target of 58% below 2005 levels would be needed to be in line with our fair share of emissions reductions to keep warming below 1.5 degrees. We recommend increasing the target to 58%. Additionally, we are very concerned about the inclusion, in the 2050 target of the phrase "by balancing greenhouse gas emission with greenhouse gas removals and other offsetting measures". First, greenhouse gas removal technologies are unproven and expensive at scale. They should only be employed once proven and as a last mile mitigation option. Second, offsetting puts the burden of GHG

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reductions on other actors and is not a scalable solution to the absolute reductions needed to keep within 1.5 C of warming. Nova Scotia's GHG targets must reflect absolute emission reductions, with a target of zero emissions by 2050.

Section 7 b and e: Both of these energy efficiency goals represent huge missed opportunities. Energy efficiency goals should receive the same priority as the renewable energy target, especially since energy savings deliver significant within-province economic and social benefits which reduce the province's reliance on meeting energy generation goals through imports. We are disappointed to see that this is one of the weaker areas of the legislation despite Nova Scotia's past leadership on energy efficiency. In particular, we would like to an amendment to modify Goal 7 e) to require all new buildings to be net-zero energy ready and to be zero-carbon-ready by 2030, at the latest. The attached document contains specific wording for 7 e as well as other recommendations to strengthen these goals.

In Section 10 c) we are pleased to see the affirmation of support for implementing the Lahey Report and Ecological Forestry. We are, however, deeply dismayed and profoundly disappointed to see that implementation pushed off for at least two more years. Nova Scotians have been promised a serious reduction in clearcutting for over a decade and the Lahey Report is over 3 years old. The delay in implementing it is unacceptable. As such we call on the government to either: A) Implement the recently released Silvicultural Guide for the Ecological Matrix on all Crown land harvesting immediately. Or B) Institute an immediate moratorium on all forest harvesting on Crown land until the new Ecological Forestry harvesting regulations are ready to be implemented.

In Section 14 a) we are pleased to see a goal supporting low impact aquaculture and improved licensing processes. These are both steps forward and could be done well with widespread stakeholder and rights-holder consultation. However, this goal depends heavily on how the government defines 'low-impact', 'sustainable', and 'environmental impacts.' We urge, in the strongest terms, the inclusion of a quantitative target and associated timeline. We recommend a 5% increase of low impact shellfish and seaweed aquaculture in 3-5 years which is an easily achievable target with the provision of a few key extension services that are currently lacking. It is profoundly disappointing to see no goal to phase open net-pen finfish aquaculture out of our coastal waters. Other jurisdictions are now recognizing the unacceptable level of ecosystem risk and lack of social license this form of aquaculture has and have committed to phasing this industry out of public waters by 2025.

To conclude, we reiterate our call for swift action on the implementation of this Act. Public consultations have shown us that Nova Scotians are ready to get to work on a

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rapid transition that leaves no one behind. With stronger accountability measures and amendments to key goals, this Act could live up to its potential to make Mi'kma'ki / Nova Scotia a leader on the environment. It is clear beyond any doubt that we must act fast to ensure a future that protects the communities and natural spaces we love and rely on as a province. We urge you to adopt key amendments to make this so. Thank you.

EGCCRA Detailed Analysis

Friday, October 29, 2021

PREPARED BY
THE ECOLOGY ACTION CENTRE

Ecology Action Centre

Environmental Goals and Climate Change Reduction Act: Analysis of Goals

We are pleased to see this set of wide-ranging targets in legislation. Now we need accountability, follow-through and immediate action to address the climate and biodiversity emergencies.

We see several very positive aspects of the EGCCRA, including a commitment to phasing out coal by 2030, the inclusion of an electric vehicle mandate, a commitment to protecting 20 per cent of the province's land and water by 2030 and a focus on equity as a core principle.

We also see some key areas that are weak or missing. We need to ensure we're not undermining our own progress by continuing with outdated industries, fossil fuel extraction and unproven carbon capture technologies. Missteps here will continue to increase our emissions and threaten our ecosystems. We will be watching for meaningful action and specifics on issues like offshore oil and gas, biomass burning, energy efficiency and open net-pen aquaculture.

Significant financial and human resources will need to be associated with this Act to ensure its rapid and successful implementation.

We recognize that many key details will be forthcoming in the Climate Plan. It needs to be released swiftly and contain adequate ambition to ensure targets are met and exceeded.

Below we provide a detailed analysis. It includes the goals and/or wording in the Act and our analysis. At the bottom, you will also find a list of key issues that are not addressed in this Act, which should be considered for inclusion.

Goal or wording in the Act	Our Analysis/What we would like to see/what we'll be watching
This Act is based on the following principles: (a) the achievement of sustainable prosperity in the Province must include (i) Netukulimk, (ii) sustainable development, (iii) a circular economy, and (iv) equity;	We're very happy to see the inclusion of "equity" as a principle of this Act.
6 The Government's targets for greenhouse gas emissions reductions are (a) by 2030, to be at least 53% below the levels that were emitted in 2005; and	We applaud a 53% target, which is the most ambitious climate target in Canada; however, we acknowledge that a target of 58% below 2005 would be needed to be in line with our fair share of emissions reductions to keep warming below 1.5 degrees.

(b) by 2050, to be net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures.	Additionally, we are very concerned about the inclusion of the phrase "by balancing greenhouse gas emission with greenhouse gas removals and other offsetting measures". First, greenhouse gas removal technologies are unproven and expensive at scale. They should only be employed once proven and as a last mile mitigation option. Second, offsetting puts the burden of GHG reductions on other actors and is not scalable solution to the absolute reductions needed to keep within 1.5 C of warming. Nova Scotia's GHG targets must reflect absolute emission reductions, with a target of zero emissions by 2050.
7 The Government's goals with respect to climate change mitigation and adaptation and the reduction of greenhouse gas emissions are (a) to complete and release a Province-wide climate change risk assessment by December 31, 2022, an update by December 31, 2025, and an update every five years thereafter;	We applaud this goal as NS needs a thorough risk assessment in order to identify priorities for climate adaptation. We are pleased to see the inclusion of a pledge to regularly update this assessment.
(b) to support, strengthen and set targets for energy efficiency programming while prioritizing equitable access and benefits for low income and marginalized Nova Scotians;	This target is a missed opportunity as it is very vague. An energy efficiency goal should receive the same priority as the renewable energy target, especially since energy savings deliver significant within province economic and social benefits which reduce the province's reliance on meeting energy generation goals through imports. We are disappointed to see that this is one of the weaker areas of the legislation despite Nova Scotia's past leadership on energy efficiency. A clear mandatory energy efficiency resource standard is required that maximizes energy savings in future with high electrification, long-term carbon-pricing, and net-zero emissions. Such a standard should include savings attributable to Efficiency Nova Scotia activities and include targets for total energy savings across all fuels, as well as specific sub-targets for electricity and fossil fuel savings. Leading American states like Massachusetts are targeting annual electricity savings equal to 2.7% of electricity sales and 1.3% of fossil fuel sales. The EAC's coal phase out report called for annual electricity savings of 3% of sales by 2030. With Nova Scotia continuing to have high rates of energy poverty, there is also a need for legislated and regulatory requirements for the benefits of energy efficiency

	to reach a large number of low income and marginalized Nova Scotians. This could include dedicating a minimum amount of overall funding to low-income energy efficiency (e.g., 15% of budget). There are several other energy efficiency related goals that should be included in this Act. These could include: a. Mandatory home energy labels at point of sale and mandatory energy and GHG reporting and disclosure from large buildings by 2023 b. Implementation of minimum energy and GHG performance standards for existing buildings by 2025 c. Seeing 75% of industrial energy use in Nova Scotia benefiting from energy management systems by 2030 d. Delivering at least $25 M in commercial building retrofit investments to Canada Infrastructure Bank
(c) to work with municipalities and First Nations in the Province to take immediate and long-term action on their climate change priorities;	The intent of this goal is very positive. We would like to see more specifics.
(d) to build climate change adaptive capacity and resilience by requiring climate adaptation planning across every Government department;	This goal is positive. Provincial coordination will be needed as it is necessary to help individual municipalities respond to funding opportunities. Though we applaud this goal, action must follow. We have had plans that were not able to be acted upon with the Municipal Climate Change Action Plans and cannot afford for this to be the case here.
(e) to adopt the 2020 National Energy Code for Buildings within 18 months of it being published by the Government of Canada;	This is a serious missed opportunity, which threatens to lock-in unnecessary GHG emissions. We would like to see the following amendment: to adopt the 2020 National Energy Code for Buildings and the 2020 National Building Code within 18 months of it being published by the Government of Canada, and to require all new buildings to be net-zero energy ready and to be zero-carbon-ready by 2030, at the latest The province should also commit to work with the federal government and other leading provinces (British Columbia) to develop a "zero carbon" building code, that

	includes consideration of operational emissions as well as emissions from building materials (embodied carbon).
(f) to require any new build or major retrofit in government buildings, including schools and hospitals, that enters the planning stage after 2022, to be net-zero energy performance and climate resilient;	We applaud this goal. We suggest extending it to any government buildings that fail to meet increasingly stringent minimum energy and GHG performance standard, and note that such a goal should benefit all buildings in the province.
(g) to encourage landlords who currently lease office space to Government to transition existing office space to meet net-zero energy performance;	This goal offers a good example of public sector leadership. Raising ambition would include requiring minimum energy, GHG, and building comfort requirements for any building or unit that is leased or rented, coupled with a low-income and energy poverty reduction strategy.
(h) to prioritize leased office accommodations in buildings that are climate resilient and meet net-zero energy performance starting in 2030; (i) to decrease greenhouse gas emissions across Government-owned buildings by 75% by the year 2035;	These are good targets.
(j) to develop and implement a zero-emission vehicle mandate that ensures, at a minimum, that 30% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030; (k) to develop and implement supporting initiatives for the goal in clause (j);	We are very pleased that the provincial government will introduce a zero-emission vehicle mandate as it is a necessary supply side measure needed to increase the number of electric vehicles available for purchase in Nova Scotia. In addition, incentives for both new and used light-duty vehicles will be required to increase access and demand in the province. The target however is low. The new federal target for new electric vehicle sales is 100% by 2035 and the Halifax Regional Municipality target of 100% by 2030. We believe Nova Scotia's ZEV target for the light duty sector should at a minimum match the federal government's ambition for 2035 and set interim targets to ensure that we are on a pathway to achieve new vehicle sale targets. We are pleased with the addition of section (k) to support this goal, as we believe this is an opportunity to create an Electric Vehicle Strategy that would include a plan for developing ZEV charging infrastructure, job training, and manufacturing opportunities.

(l) to have 80% of electricity in the Province supplied by renewable energy by 2030; and	This is an achievable target. In fact, combining with deep energy retrofits, 90% is possible as shown in the Electricity Report commissioned by the EAC in 2019. In order to make this target robust, just and future ready, focus needs to be on increasing supply for wind, solar and energy storage, complete phase-out of natural gas and biomass energy, strong collaboration and coordination with Atlantic provinces and Quebec on regional integration (Atlantic Loop), enhanced energy efficiency programming with target to reach 3% efficiency per year by 2030. Hydrogen development is an important piece, where we need to steer clear of "Blue Hydrogen" which is based on fracked gas, and instead focus on development of "Green Hydrogen" produced from surplus renewable energy. It's important to define what qualifies as clean energy source – biomass is not renewable and causes more emissions than mitigation/capture; carbon capture storage (CCS) is very expensive, uneconomical, faced high failure rate in international cases, and unproven. Money would be better spent in developing wind, solar and energy storage (including thermal energy storage) resources.
(m) to phase out coal-fired electricity generation in the Province by the year 2030.	This is a welcome move. The EAC has been advocating for this for the better part of a decade. We must ensure that this coal phase out is in sync with development of renewable energy and regional integration to balance out the supply using cheap renewables. This would ensure reliability but also affordability. Now, it is important to put dates on decommissioning coal plants in the province. At the same time, in the federal context, the equivalency agreement should be dissolved and made null and void. Nova Scotia should stand as an example for New Brunswick, and collaborate with NB to decarbonize the Atlantic region.
8 (1) The Government shall create a strategic plan, prior to December 31, 2022, to be known as the "Climate Change Plan for Clean Growth" that addresses (a) achieving the greenhouse gas emission targets set out in Section 6; (b) adapting to the impacts of climate change and building a climate resilient Province; (c) accelerating the integration of sustainable and innovative technologies and approaches; and (d) clean inclusive growth.	We are troubled by the frequent use of the word "growth" as it is clear that as a society, we need to rethink the necessity for economic growth. Our current obsession with growth has resulted in the accumulation of enormous wealth for increasingly few and resulted in supply systems becoming more and more exposed to global political, ecological, and social disruption. Sustaining ecosystems that sustain us must be understood as a fundamental economic principle. Wellbeing must be prioritized over GDP and/or included in its calculation. We are, however, looking forward to the release of the climate plan. As this plan has been in development for nearly two years, we would encourage a swifter timeline than a December 2022 release.

(2) The Government shall release annual progress reports on the plan outlined under subsection (1) and review and renew the plan within five years of its release.	We are pleased to see that it will include both mitigation and adaptation measures. For specifics of further elements we would expect to see in a climate plan, please refer to other sections of this document, as well as our briefing note series submitted as part of the recent consultation process: https://ecologyaction.ca/environmental-goals-climate-change-reduction-act-policy-background-resources We are also pleased to see the inclusion of annual progress reports as these are essential to transparency, accountability and achievement of the targets. Comprehensive progress reports would include: assessments and recommendations, not simply reporting; relevant data; clear articulation of the trajectory toward meeting the targets; explanations of why targets aren't being met (if that's the case) and plans to address any shortcomings.
9 The Government's goals with respect to active transportation are (a) to establish a Provincial Active Transportation strategy to increase active transportation options by 2023; and (b) to complete core active transportation networks that are accessible for all ages and all abilities in 65% of the Province's communities by 2030.	We are very pleased to see Active Transportation included in the goals. A Provincial Active Transportation Strategy will be an invaluable tool for coordinating the funding/budgeting and implementation of AT infrastructure and unlocking federal funding. However, it is crucial that that a Provincial Active Transportation Strategy includes soft infrastructure like pedestrian/bike safety education, bike maintenance education, access to bike repairs, and snow clearing plans - allowing for the safe and continued use of hard infrastructure (sidewalks, off-road trails, bike lanes and paved shoulders). Likewise, the strategy should be informed by the voices of underserved and marginalized communities, BIPOC communities and youth to adhere to the government's commitment to equity. The government's commitment to developing the Strategy by 2023 and implementing it by 2030 is an ambitious goal. We applaud the urgency this timeline sets, and recognize this requires strong partnerships with support from all participating departments along with consistent, inclusive public engagement with communities. Much work is ahead.
10 The Government's goals with respect to the protection of land are (a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;	This is excellent and will ensure Nova Scotia will meaningfully contribute toward Canada's international commitment to protect at least 30% of our county by 2030. The wording of this goal should stay exactly as originally written. There is still so much we can do through protecting land that would substantially aid with the climate and biodiversity crises, and would help to advancing reconciliation. Inclusive planning for a new protected areas strategy is the necessary next step. We look forward to working with government on this laudable work.

(b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;	There is a lot of work to do in order to protect freshwater sources, including wetlands, and groundwater resources. Fortunately, we have many institutions and people whose knowledge and experience can guide planning to protect water, and we call on the government to collaborate with nongovernmental organizations, academic institutions, Indigenous Nations and organizations, and other water-centered community groups when creating a protection strategy and making decisions on freshwater protection.
(c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" prepared by William Lahey in 2018, through the triad model of forest management that prioritizes the sustainability of ecosystems and biodiversity in the province; and (d) to identify by 2023 the percentage allocation of Crown land dedicated to each pillar of the triad model of forest management referred to in clause (c).	We are pleased to see the affirmation of support for implementing the Lahey Report and Ecological Forestry. We are, however, deeply dismayed and profoundly disappointed to see that implementation pushed off for at least two more years. Nova Scotian's have been promised a serious reduction in clearcutting for over a decade and the Lahey Report is over 3 years old. The delay in implementing it is unacceptable. As such we call on the government to either: A) Implement the recently released Silvicultural Guide for the Ecological Matrix on all Crown land harvesting immediately. Or B) Institute an immediate moratorium on all forest harvesting on Crown land until the new Ecological Forestry harvesting regulations are ready to be implemented.
11 The Government's goals with respect to water and air are (a) to develop provincial water quality objectives to guide activities that affect water quality by 2026; (b) to address and mitigate barriers Nova Scotians face to testing and treatment of rural wells by 2026;	We applaud these goals. We encourage the Province to prioritize both goals and address them by 2023. To ensure safe and healthy water for both human use and the local ecosystems, the water quality objectives must include consideration for the quality of surface water (i.e., lakes, rivers, streams, wetlands etc.) and groundwater, and prioritize watershed-based decision making. We call on the Province to commit to encouraging nature-based solutions to help address water quality issues and to supporting existing data collection efforts by investing in community-based water monitoring initiatives and using this valuable data to help guide future decisions on water.
(c) to manage the Province's air zones consistent with the Canadian Ambient Air Quality Standards; and	We do not have the expertise to provide an assessment of this goal.

(d) to review and update the Province's air emission targets and ambient air quality standards by 2025 and conduct reviews and updates every five years or sooner if the Minister so directs.	
12 The Government's goal with respect to environmental assessments is to modernize the environmental assessment process by 2024 taking into consideration (a) cumulative impacts; (b) diversity, equity and inclusion; (c) independent review; (d) Netukulimk; and (e) climate change.	This is positive as the environmental assessment premise and process need a complete overhaul in Nova Scotia. This goal starts to get at key elements that are missing from Nova Scotia's antiquated approach. Proper inclusion of these factors is long overdue and could result in improvements to environmental protection. The needed revamping of the system must be done in collaboration with partners outside government, who have been witnessing and documenting systemic problems with environmental assessments for years.
13 The Government's goal with respect to sustainable procurement is to demonstrate leadership in sustainable procurement by increasing innovation, sustainability, diversity and inclusion in government procurement and considering community benefits attached to procurements.	This is positive; however, it requires specifics.

14 The Government's goals with respect to aquaculture and food are (a) to support low-impact sustainable aquaculture through a licensing process that weighs environmental considerations and includes provincial regulation for potential environmental impacts, animal welfare and fish health; and	We are pleased to see a goal supporting low impact aquaculture and improved licensing processes. These are both steps forward and could be done well with widespread stakeholder and rights-holder consultation. However, this goal depends heavily on how the government defines 'low-impact', 'sustainable', and 'environmental impacts.' We would prefer to see a quantitative target and timeline associated with this such as a 5% increase in 3-5 years - an easily achievable target for low impact shellfish and seaweed aquaculture with the provision of a few key extension services that are currently lacking. It is disappointing to see no goal to phase open net-pen finfish aquaculture out of our coastal waters. Other jurisdictions are now recognizing the unacceptable level of ecosystem risk and lack of social license this form of aquaculture has and have committed to phasing this industry out of public waters by 2025. Nova Scotia should include a commitment to support closed containment, on-land alternative systems for finfish. This would move the province into a leadership role in the industry, contribute to rural job creation, reduce environmental risk, and build on our province's infrastructure and expertise in seafood.
(b) to develop a Provincial food strategy for enhanced awareness of, improved access to and increased production of local food to achieve 20% consumption of local food by 2030.	We applaud this goal; however, the timeline is longer than should be necessary. In particular, we look forward to the development of a Provincial food strategy. We hope it will support municipalities and include such actions as the implementation of a healthy school food program, and other institutional procurement measures, as well as supports for farmers to mitigate and adapt to climate change. Additionally, we recommend that the Province build on HRM's municipal food strategy, JustFOOD, currently in development.
15 The Government's goal to encourage the growth of the circular economy includes, but is not limited to, (a) expanding extended producer responsibility and reducing the use of single-use plastics; (b) reducing solid waste disposal rates to no more than 300 kilograms per person per year by 2030; and	In 2007 the Nova Scotia government set a target of three hundred kilograms of waste per person per year by the year 2015. While there was some early progress, in 2021 Nova Scotians are producing approximately 400 kg per person per year of waste. We would like to see more ambition in this goal – reducing solid waste disposal rates to no more than 200 kg per person per year by 2030. Additionally, we should aim to reduce plastic waste to zero by 2030.

(c) developing a plan, including specific actions and interim targets, by 2023 to meet the solid waste goal in clause (b).	
16 The Government's goals to support business, training and education are (a) to actively encourage innovative, sustainable and green businesses to establish or relocate to the Province and create an environment for innovative, sustainable and green business start-ups; (b) to work with small businesses across the Province to get their input on ways to reduce emissions, including through rebates, targeted investments and other supports; (c) to work collaboratively with businesses, the Nova Scotia Community College and the labour sector to modernize apprenticeship programs to ensure the Province has the tradespeople needed to meet the demands of the clean economy; (d) to support youth to engage in the clean economy through sustainability-based youth employment leadership programs in the Province; and (e) to promote and support climate change education and sustainability through the knowledge and teachings of Netukulimk and environmental stewardship with ongoing curricula renewal, the development of inclusive and accessible resources and professional learning that incorporates diversity and honours Etuaptmumk.	We are pleased to see goals that aim to build an inclusive and green economy in our province however we are disappointed by the lack of a goal that handles the just transition of workers from the fossil fuel industry and affected communities. Including environmental education in the grade school curriculum has been needed for years, for broader societal need than just business development. The Province should work with Indigenous and non-Indigenous partners on this goal in order to benefit from the extensive knowledge, networks, and resources that already exist on these topics. We hope that the Province is now truly open to swift and substantial change in the curriculum, since it is a long time coming.

17 The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities to create a sustained funding opportunity for climate change action and support for community-based solutions and policy engagement.	The intent of this goal is very positive. We would like to see more specifics.
18 (1) The Sustainable Communities Challenge Fund is established. (2) The money in the Fund must be managed and used in accordance with the regulations to create competitive opportunities that encourage communities in their climate change mitigation and adaptation efforts.	The intent of this goal is very positive. We would like to see more specifics. We hope this funding can be accessed by municipalities, First Nation communities, and groups without significant matched funding or other onerous requirements that could be a barrier for many.
19 The Premier shall meet with the Round Table annually to discuss progress on sustainable prosperity and may include at the meeting any member of the Executive Council the Premier deems appropriate. 20 The Premier shall ensure that sustainable prosperity is included in the mandate of every Government department. 21 (1) The Minister, in consultation with such members of the Executive Council as the Minister deems appropriate, shall report annually to the House of Assembly on the progress made toward the long-term objective of sustainable prosperity, including progress toward achievement of sustainable prosperity goals and initiatives established pursuant to this Act.	Ensuring strong accountability and transparency mechanisms in the Act are critical to achieving the goals and building the public's trust. We would like to see the following amendment to improve accountability: S (21) (2) that in preparing the report the Minister MUST seek advice from the roundtable. We also recommend that the Roundtable be given authority and resources to provide recommendations to the Minister for in preparation for the report, and these recommendations will be publicly available. The Roundtable, or those conducting the external review, should be provided with resources, data, and expertise needed to provide a proper assessment progress on the Act. In addition to the legislated 2030 and 2050 goals, interim targets must be set (i.e. 2025, 2035, 2040, 2045). The years leading up to 2030 are where we need to see the steepest reductions in emissions. If we do not meet the targets leading up to 2030, we will not be able to mitigate 1.5 C of warming. The importance therefore of meeting the 2030 target cannot be overstated, and we must ensure that robust interim targets and accountability measures are in place to ensure that we are on a pathway for emission reduction. * See Goal 8 for further comments on accountability.

(2) In preparing the annual report referred to in subsection (1), the Minister may seek advice from the Round Table. (3) The Minister shall table the annual report referred to in subsection (1) in the House of Assembly on or before July 31st of the year in which it was completed or, where the House is not then sitting, file it with the Clerk of the House. 22 The Minister shall request the Round Table to carry out a public review of this Act and the regulations (a) no later than five years after this Act comes into force; and (b) at any other time the Minister considers appropriate.	

What Is Missing

Oil & Gas	The EAC would like to see the government commit to end all subsidies, supports and development of fossil fuels in Nova Scotia's offshore and invest in policies and programs to support oil and gas workers and affected communities transition to a low-carbon economy so as to ensure no one is left behind.
Transit	We would like to see a Provincial Public Transit Strategy that centers mobility independence. Making the province accessible by transit for people of all ages and all abilities will provide a viable alternative to driving for everyone. Existing community/rural transit services are legally limited to operation in defined boundaries, making regional t ransport cumbersome for both operators and passengers, especially seniors going to medical appointments. The lack of rural and regional transit limits the ability to access essential services and participate in community life for people who cannot drive. Planning better integration of existing community transit services and/or creating a provincial transit provider would complement the Provincial Active Transportation Strategy.
Biomass	We repeat our longstanding position and request that the government remove biomass from the Renewable Electricity Regulations, stop counting the burning of biomass as "carbon neutral" or zero

	carbon emitting (it's not), and ban the use of forest biomass for domestic and foreign export energy generation.
Fleets and Heavy-Duty Transportation	We would like to see a GHG reduction strategy for the heavy-duty transportation sector. We see this as a critical opportunity to electrify transit, passenger ferries, fleets and fund innovation for long-haul trucking. In addition to passenger vehicles, this is a key opportunity to reduce emissions from the transportation sector.
Carbon Pricing	Study after study has proven that carbon pricing is a critical tool to achieve emission reductions, including those stated within this act. We would like to see details on the carbon pricing in Nova Scotia within this Act.

FONDATION SIERRA CLUB CANADA FOUNDATION ATLANTIC

An Emergency Response to Nova's Scotia's Environmental Goals and Climate Change Reduction Act

Submitted by Sierra Club Canada Foundation

Presented by Gretchen Fitzgerald, National Program Director, and Tynette Deveaux, Beyond Coal Atlantic Campaign

e·mer·gen·cy (Merriam-Webster)

-NOUN /ə'mərjənsē/

an unforeseen combination of circumstances or the resulting state that calls for immediate action.

In order to adequately respond to the climate emergency, EGCCRA must

Add the following interim targets to phase out coal by 2030:

2022 - Nova Scotia will phase out 25% of its coal-fired electricity generation
2025 - Nova Scotia will phase out 50% of its coal-fired electricity generation
2028 - Nova Scotia will phase out 75% of its coal-fired electricity generation

Add under section 7:

Prohibit all new offshore oil and gas activity as of January 1, 2022 and phase out all offshore oil and gas activity by January 1, 2025

Commit the province to joining the global Beyond Oil and Gas Alliance (BOGA) as a sign of this government's climate leadership.

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re·new·a·ble

-NOUN /rə'n(y)o͞oəb(ə)l/

capable of being replaced by natural ecological cycles or sound management practices.

In order to support sustainable prosperity and clean renewable energy, EGCCRA must

Define renewable energy in Bill 57:

The definition can *only* include those energy sources that will reduce GHG emissions and fully adhere to the criteria of a circular economy and Netukulimk, as currently defined in the bill

Amend section 7 (l) as follows:

100% of the province's electricity is generated from ***clean*** renewable sources by 2030

Forest biomass for electricity generation *cannot* be included as a renewable energy source until the majority of forests in NS are once again mature old-growth forests.

Add interim target dates as follows:

75% of the province's electricity is generated from clean renewable sources by 2025
Burning forest biomass for electricity generation will be phased out in 2022

Include the following with regards to natural gas:

Require the phase-out of natural gas power generating stations by 2030

Allow no new natural gas generating stations

With respect to hydroelectricity, clarify the following:

Only small scale hydro projects (under 30 MW) may be included as renewable hydro energy
No new environmentally destructive mega hydro projects can be brought on to Nova Scotia's power grid, such as the proposed Gull Island Project in Labrador, which would be integrated into the province's energy grid via the Atlantic Loop

With respect to nuclear power, specify that

No power generated by small modular nuclear reactors can be included in Nova Scotia's electricity mix (i.e. via the Atlantic Loop)

Presentation to Law Amendments Committee:
Bill 57 - Environmental Goals and Climate Change Reduction Act, Nov.1, 2021

I am speaking on behalf of the Annapolis County chapter of Extinction Rebellion. First, thank you for having me. Opportunities for citizens to participate directly in the shaping of legislation are important. I hope this government will take seriously the efforts citizens put into their presentations to this committee.

There is much that is good in Bill 57 and it is a great improvement over the previous government's Sustainable Development and Goals Act, in particular because it establishes timelines within the legislation. Unfortunately, those timelines still do not match the urgency of our situation. We are facing twin emergencies vastly more deadly than COVID.

We need the government to tell the truth about the severity of the nature and climate crises, and about what has to be done. And we need the government to act now. We need clear mandates with timelines that are based on science. What we do – or don't do – to cut emissions in the next nine years will determine whether climate chaos and ecosystem collapse become the reality for all future generations. They are already impacting us.

I'll leave the detailed critique of most of this bill to people who know far more about the specifics of emissions reductions. I want to talk about something crucially important that is missing from this bill: adequate attention to the biodiversity crisis.

In June 2021, the world's leading biodiversity and climate experts, convened by the Intergovernmental Panel on Climate Change and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, produced a peer-reviewed report for the world's political leaders. (Search IPBES-IPCC Co-Sponsored Workshop Report.)

The report leaves no doubt that the climate crisis cannot be solved without solving the nature crisis and vice versa.

It identifies actions to simultaneously fight both crises, including expanding nature reserves and restoring – or halting the loss of – ecosystems rich in species and carbon, such as forests, natural grasslands and kelp forests.

The only way Bill 57 addresses the biodiversity crisis is by mandating the protection of 20% of our land and water by 2030. This is a definite improvement over previous goals but I would urge that we need an earlier target of 2025. This will not be easy to achieve but it is essential. Our federal government has agreed to implement the UN's goal of protecting 30% of lands and waters on earth by 2030.

Here in Nova Scotia we should get cracking on our 20% target. First on the to do list: restore Owls Head, with its globally rare ecosystem, to the list of proposed Parks and Protected Areas then immediately protect all the areas on the PPA list.

Bill 57 should include an explicit commitment by the provincial government to obey its own Endangered Species Act. This provision should not be necessary, of course, but when successive governments have failed – for 17 years -- to identify core habitat for listed species, as required by law, and when governments still appear to be ignoring the Nova Scotia Supreme Court's finding of a 'chronic and systemic failure' to follow the law, it is necessary to spell it out.

In light of the continued failure to identify core habitat for Mainland moose, all the areas of Crown land identified in 2012 as Mainland Moose Concentration Areas should be granted temporary protection immediately. All logging and road building operations in these areas should be halted until core moose habitat areas have been identified. These core areas should then be granted immediate, permanent protection.

To return now to the necessity of addressing the nature and climate crises together: one consequence of treating them in isolation is that you get governments signing on to incredibly damaging practices such as burning biomass to generate supposedly green energy.

Burning trees to generate electricity encourages overharvesting. It is fiction to claim the biomass plants running right now in Liverpool and Port Hawksbury run on sawmill waste. There aren't enough good sawlogs left to generate that volume of waste. Instead, supplying these plants and selling woodchips overseas supports the low value, high volume model of forestry that has devastated our forests, damaging whole ecosystems in ways that may be irreparable, given our poor acidic soils and the increasing stresses brought by climate change. To add insult to injury, the electricity generated by burning biomass is dirtier than coal. It is essential that this bill remove biomass from the list of renewable energy sources.

These are not the only ways that Bill 57 fails to address the biodiversity crisis as it is intertwined with the climate crisis. Most shocking of all is the failure to implement immediately the long promised move from clearcutting to ecological forestry on our public lands. This transition has been called for by the public and by scientists for over ten years. Three years ago Mr. Lahey released his recommendations for how to manage this transition while allowing the forestry industry some of what it wanted. The government of the time accepted all his recommendations, as indeed this government has claimed to. This summer, the crucial Silvicultural Guides for the Ecological Matrix (SGEM) were completed. But now, instead of actually implementing the Lahey report, the Bill proposes to delay the transition by another two years.

At the pace of clearcutting that has been allowed – no, encouraged – by one provincial government after another, in two more years the few remaining mixed species, mixed age Wabanaki forests on Crown land will be gone. There will be hardly a shred of forest older than 60 years left standing. In case you think I am exaggerating, between 1958 and 2003, according to forest inventories, the proportion of forest in Nova Scotia aged more than 61 years fell from 59% to 13.5%. By 1995 less than 3% of the forest was older than 80 years. As for actual old growth forests, forests over 120 years, we are down to 0.15%. There is frighteningly little left. When I first started going out to identify proposed cut blocks, I found it difficult to be sure I had the right spots. Now, in my part of the province, I drive down a logging road surrounded by young, short trees. When I see a stand of taller trees in the distance, I know that will be the block. Everything else has been cut already.

This massive habitat loss directly contributes to dramatic declines in wildlife populations. In North America we have lost a billion birds since 1970. Older forests support far more biodiversity than young forests. They also store far more carbon. In these forests, as much carbon is stored in the soil of the forest floor as in all the trunks and branches above ground. Forests like these are the best carbon capture technology we have. They are the most affordable and they work. Until you cut them down.

Once a forest is clearcut, you lose the carbon capturing efforts of all the trees in that forest. The young forest that will regrow -- climate change and soil degradation permitting -- will not sequester any significant carbon for forty years. Not until 2060, in other words. Too late. But it gets worse. Not only do you lose the trees storing carbon when you clearcut; once the forest is all gone, the exposed soil releases the carbon it has been storing. Over a decade or so it releases as much carbon again as the trees above ground were storing. This is part of how Canada's industrially logged boreal forests have become net-carbon emitters. They are now part of the problem.

Ecological forestry avoids this ugly consequence. It does not take too much at one time, and it does not come back for more before the forest is ready. By never taking more than 30% of the forest, so retaining at least 70% of the canopy, the forest lives on. Except in small patches that mimic natural disturbance, the soil is never exposed to drying sun and winds. The different layers of vegetation go on growing. Habitat for wildlife is preserved. The fungal networks of communication and cooperation live on in the soil, promoting the health of the forest. In this way we can have our forests and everything they offer, ecologically, economically, socially, spiritually, while still harvesting some timber.

The necessary tool is in place to transition from the devastation of clearcutting to this sustainable version. And yet this bill wants to delay the transition by two more years. Two more years in which clearcutting would proceed apace, to judge by the plans that have been moving through the province's Harvest Plan Map Viewer in the two months since Tim Houston took office. In these 2 months, 4211 acres have come up for comment. 91% of those harvest plans are for clearcuts, by the government's own definition.

This has to stop. Those prescriptions are generated using the interim Forest Management Guide. The new SGEMs are ready to use. They are far from perfect but the prescriptions they generate will finally move us from clearcutting to ecological forestry. There is no excuse for refusing to use them. If they are not put to use right away then we need an immediate moratorium on further clearcutting of crown land until they are.

In light of the rapidly worsening crises we face, our standing forests have become even more valuable than when Mr. Lahey wrote his report. The value of the ecosystem services and carbon storage capacity live forests provide now far outweighs their value as 'forest products.' In light of this, landscape level planning will be needed to assess whether any forested lands will be available for 'High Production Forestry.' Certainly only areas that have already been turned into industrial plantations – ecological deserts, in other words – can be considered.

Protecting and restoring ecosystem health is the overarching priority in the forestry transition Mr. Lahey recommends. We must start reversing the damage done by outmoded forestry practices right now. We certainly cannot afford two more years of 'talk and log.'

In every direction we look, it is time to act. We know what we have to do. Slash emissions. Stop destroying nature. Respect Indigenous rights. Look after each other and our non-human kin as we make the transition. Let's do it. Bill 57 is a start but it needs to address the nature crisis as well as climate change.

Nina Newington
Extinction Rebellion Annapolis County

Bill 57 – Environment Goals and Climate Change Reduction Act

Good afternoon. My name is Lara Ryan and I am a sustainability consultant. I spent 12 years in the green building sector as Regional Director for the Canada Green Building Council. In addition to ESG consulting for private sector clients, I am currently working on an Energy Benchmarking, Disclosure and Labeling pilot and a Net Zero Energy Ready Workforce Coalition for the provincial government and a Retrofit pilot project for HRM. I am also on the board of the Nova Scotia Nature Trust.

I applaud the new government's action on the new Environmental Goals and Climate Change Reduction Act and I hank you for the opportunity to make suggestions for amendments to the proposed legislation.

Buildings represent significant potential for economic growth through innovation, investments and job creation. Nova Scotia's built environment is a significant contributor to GHG emissions. By constructing low-emission buildings and retrofitting Nova Scotia's existing building stock, the government will lower emissions, create new jobs, and scale-up investments and innovation. At the same time, these investments will ensure its building stock is more resilient to future climate conditions such as extreme weather, forest fires, flooding or droughts. Over 80 per cent of existing buildings will still be in operation in 2030 and 50 per cent in 2050, and therefore it is essential that existing buildings are addressed to meet GHG reduction targets for the building sector.

Near-term government action is needed to ensure that zero-carbon-ready buildings become the new norm across the world before 2030 for both new construction and retrofits. This requires governments to act before 2025 to ensure that zero-carbon-ready compliant building energy codes are implemented by 2030 at the latest

The cost of not adopting a zero-carbon approach increases with each passing day. Every building not designed or recommissioned to low-/zero-carbon will contribute to increased carbon emissions—and will inevitably require major investments in mechanical equipment, ventilation systems, and building envelopes to meet future GHG reduction targets.

Nova Scotia should set a clear goal of zero carbon for new construction by 2030, which research shows is financially and technically viable for the industry. This would provide clarity to developers, designers, and builders about future performance expectations and help them assemble the expertise, processes, and investments needed to be successful.

Nova Scotia could do this by adopting the 2020 National Energy Code for Buildings and the 2020 National Building Code within 18 months of it being published by the Government of Canada, and to require all new buildings to be net-zero energy ready and to be zero-carbon-ready by 2030, at the latest.

For Nova Scotia to achieve significant reductions in GHG emissions and energy use it is crucial that significant improvements in the efficiency of its existing building stock are realized. Benchmarking is the process of data collection through which a building's resource use is monitored to assess performance and enable comparison with similar buildings. Typically, benchmarking programs require owners of buildings over a certain size to track and often also publicly report their resource use performance data

(energy use, water use, and GHG emissions). Energy benchmarking is a foundational piece for a retrofit economy that can help improve the effectiveness of energy efficiency projects and support programs and policy for all building types.

Having access to building performance data also allows owners to assess how their buildings are performing and helps to drive improvements by identifying opportunities for energy and GHG reductions and allows prospective tenants and buyers to make more informed choices about where to buy or rent.

In 2019 Nova Scotia began a three-year energy benchmarking pilot project managed by Efficiency Nova Scotia. Using learnings from the pilot, Nova Scotia should enact mandatory benchmarking, disclosure and labeling for provincially owned and operated buildings as soon as possible with the phased rollout to all large commercial buildings beginning by the end of 2022.

Building code amendments can also activate retrofits in the existing building stock by triggering energy efficiency upgrades in buildings undertaking substantive renovations. Energy conservation and efficiency are critical components of a strategy to reduce GHG emissions from buildings. However, there is also a need for mechanisms that direct the building industry towards low- and zero-carbon energy choices and building designs.

The majority of carbon pollution reductions in the building sector need to come from existing buildings. Building code changes tackling energy efficiency will not be sufficient to reach the required GHG emissions reductions in the building sector. Energy efficiency will generally, but not always, lead to reduced GHG emissions. Without a greenhouse gas intensity emission metric (GHGI), reductions in carbon from buildings are likely to be incremental.

Using a GHGI metric with other measures that encourage high energy performance and sustainable building design will help drive choices about the types of energy that are used in buildings and promote decarbonization through electrification to leverage on-site renewable energy generation in buildings.

To achieve the large reductions in GHG emissions required from building design and retrofit decisions, the Government of Nova Scotia should consider including a GHGI metric in addition to energy efficiency performance metrics.

Respectfully submitted
November 1, 2021
By Lara Ryan
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Good afternoon,

We are Kurt Sampson and Kelsey Lane. We are here today speaking on behalf of EVAAC, the Electric Vehicle Association of Atlantic Canada. We are a member-based organization of over 1.3 thousand electric vehicle owners and enthusiasts from across Atlantic Canada. EVAAC was formed to share knowledge, advocate for EV (electric vehicle) policies, and build a community for those that share our passion and mission of accelerating the transition to clean electric transportation.

EVAAC welcomes the introduction of the Environmental Goals and Climate Change Reduction Act. Though it has been stated in the Act and by others here today, it is worth repeating; we are in a climate emergency. Everywhere, we must act with an urgency that is proportional to the scale and pace of the climate crisis unfolding before us.

Transportation accounts for approximately 30% of our greenhouse gas emissions in Nova Scotia. Electric vehicle adoption is critical to ensuring that Nova Scotia is rapidly reducing GHG emissions.

I grew up in Antigonish county on a used car dealership. I've owned, operated, and serviced many vehicles over my lifetime. I work in I.T.; so am comfortable around technology. I have two young children, and I have supported & volunteered for many environmental organizations. So you can see that I am practically a textbook early EV adopter. My children have never know us to have a vehicle that runs solely on fossil fuels since our family has had three hybrids and three fully electric vehicles, all purchased used, over the past 10 years. All of our EVs have been great to drive, easy to own and maintain, and they save us hundreds of dollars each month on fuel & maintenance while significantly reducing the negative impact that our lifestyle has on our children's future environment, health, and safety.

Driving an EV in NS is not only possible, it's more convenient most of the time. Because we live in a detached rural home it's easy for us to charge our EV every day. At about 100km, our daily commute has always been within the range of our EVs, and our current EV has about 400km of range so we now do long trips in our EV also, though long trips do require more planning in an EV than with a fossil-fueled vehicle at the moment due to the availability of charging infrastructure.

Families who own an EV save an average $1400 per year in fuel and maintenance costs. This has huge benefits to our economy. A study conducted by Garner Pinfold in 2019 estimates that $112

million dollars would be saved by households in Nova Scotia every year if we hit the current 2030 ZEV target.

According to Health Canada, approximately 14,600 premature deaths per year can be attributed to air pollution. A recent study conducted in partnership with the University of Toronto, Environmental Defense and the Ontario Ministry of Health demonstrated $10K of social benefit for every gas-powered vehicle that is replaced with an electric one. Those benefits are shared by everyone, not just the people buying the cars.

Benefits of EVS

From strictly an environmental perspective, we will not be able to achieve our 2030 and 2050 climate targets without rapidly electrifying the light-duty transportation sector. If we meet the 2030 target, every year EVs will allow us to avoid 380 thousand tonnes of GHG emissions compared to the baseline scenario. Even with the current energy mix in Nova Scotia, EVS are 50% cleaner than gas powered vehicles. As our province transitions to renewable energy sources electric vehicles will become even more efficient and technology is rapidly evolving to make driving an EV even more sustainable. For instance Nova Scotia Power is currently piloting new charging technology that allows for EVs to charge at times and rates that will help level grid demand and maximize renewable energy production. The Tesla lab at Dalhousie University is currently exploring the ways in which EV batteries can be used as energy storage solutions to further optimize our renewable grid.

Target

For these reasons, we are very pleased that a ZEV or "zero emission vehicle" target has been included in this Act. It is in-line with Canada's previous electric vehicle sales target. However, the landscape is shifting quickly. Recent policy developments have shown us that we can go much further than the ZEV target tabled in this Act of 30% of new vehicle sales by 2030, and the science is telling us we must.

Last year, Quebec introduced their updated climate plan which aims to have 1.5 million electric vehicles on the road in Québec by 2030 and to ban sales of new gasoline-powered cars and passenger trucks as of 2035. In June, our federal government increased their ZEVe sales target from 100% of new vehicles by 2040 to 100% by 2035. In October, British Columbia released their climate plan committing to 100% ZEV adoption by 2035. And right here in Nova Scotia, the Halifax Regional Municipality's HalifACT 2030 climate plan has one of the most ambitious commitments of 100% ZEV adoption by 2030.

EVAAC recommends Nova Scotia amend the Goal 7(j) of the Act to read that by 2035 **100% of new vehicle sales will be Zero Emission Vehicle, and at a minimum aligns with the national ZEV target.** We also ask for interim targets to be set for 2025 and 2030 to ensure that we are on track to achieving our goal and send a strong signal that we are committed to this transition. These interim targets are especially important, because until the federal government reaches its

100% new vehicle sales target, provinces can expect a discrepancy in the supply of EVs, where the majority will be funneled to the jurisdictions with the most competitive targets and policies.

Jurisdictions are increasing their ZEV targets not only because of the impact this will have on emissions, but because positioning a region as a leader in the electric vehicles market is a strategic economic move in a competitive market. And Nova Scotia has an opportunity to do the same.

Policy Tools

Provincial incentives and a ZEV mandate (like the one referenced in this Act) are policy levers needed to alleviate two key barriers that face EV adoption in Nova Scotia; high incremental up front cost and limited vehicle supply. Incentives help drive interest and demand for electric vehicles. A zero-emission vehicle mandate helps increase supply of electric vehicles in Nova Scotia.

In 2019, a report conducted by Dunsky Energy Consulting demonstrated that, while many Nova Scotians want their next vehicle to be electric vehicles, 90% of dealerships did not have an electric vehicle on the lot. This is partially due to the absence of a ZEV mandate.

Nova Scotia is competing with other jurisdictions that have a ZEV mandate which guarantees a percentage of EV sales. It is therefore attractive for manufacturers to allocate and prioritize EV distribution to those regions. There are currently two provinces and twelve states that have adopted a ZEV mandate for that very reason. We are very pleased that a ZEV mandate has been included in the Act. Up until now, it has been a missing piece of an EV policy package that will not only boost provincial sales but also make buying an electric vehicle easier for Nova Scotians.

Comprehensive Plan

EVAAC is supportive of the additional measure section 7 (k) *"to develop and implement supporting initiatives for the goal in clause (j).* In addition to the ZEV mandate and incentives, there are two other pillars needed to meet our potential for electric vehicle adoption; incentives, charging infrastructure and education. We hope that section 7 (k) of the Act will be used to develop an Electric Vehicle Strategy for Nova Scotia, that includes the following elements:

- Expand the public electric vehicle charging network in Nova Scotia proportional to the ZEV sales targets; amend the Nova Scotia Municipal Act to allow municipalities to create charging requirements for multi-unit residential buildings; and direct the UARB to permit Nova Scotia Power to make significant investments in EV charging infrastructure & complimentary services.
- Support education programs such as Next Ride, that allow members of the public to receive information about owning an EV and test drive a variety of models.
- Transition publically owned fleets to zero emission vehicles by a set date.

- Further develop training and transition programs for green jobs related to the growing ZEV industry including careers related to maintenance, installation, operations and technology.

Contextualizing the ZEV Goal in other priorities

Though the benefits of transitioning to electric vehicles on their own are numerous, these benefits of are amplified when we achieve the other goals in the act such as switching our to renewable electricity generation.

EVAAC also recognizes that creating a sustainable transportation system is not just about electrifying cars. In addition to making EVs more accessible, we must also improve the conditions for people walking, using a mobility device, cycling, taking transit, car-pooling and car-sharing. We need to elevate all sustainable modes in order to achieve an equitable, clean and affordable transportation system where all Nova Scotians have convenient options to get around.

We encourage the province to explore and set additional targets for electrifying fleet vehicles, transit, micro-mobility programs such as bike share, and decarbonizing the heavy-duty vehicle sector.

EVAAC members are eager to accelerate electric vehicle adoption in our province. Together, let's drive down emissions and get Nova Scotia plugged in to a new transportation system that allows everyone to prosper. Thank you for inviting EVAAC to participate today, and we look forward to answering any questions.

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Affordable Energy Coalition

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Adsum for Women and Children
Antigonish Emergency Fuel Fund
Antigonish Women's Resource Ctr
Community Advocates Network
Community Society to End Poverty
Dalhousie Legal Aid Service
Ecology Action Centre
Every Woman's Centre, Sydney
Face of Poverty Consultation
North End Community Health Centre
North Preston Futures Community Organization
NS Public Interest Research Group
Responsible Energy Antigonish
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November 1, 2021

Submission to the Nova Scotia Law Amendments Committee
Re. Bill 57 -Environmental Goals and Climate Change Reduction Act
From the Affordable Energy Coalition
Presented by Brian Gifford, Chair

Introduction

The Affordable Energy Coalition applauds some of the commitments in the draft Environmental Goals and Climate Change Reduction Act that are stronger than in earlier laws. We also applaud your attempt to put more of the goals into the Act instead of in regulations.

However, like other Nova Scotians we believe the climate emergency calls for much stronger action if we are to do our fair share in keeping world temperature rise to 1.5 degrees. As we transition to a zero carbon economy, it is also vital that we have clear goals to bring deep energy efficiency and highly efficient electric or zero carbon heating systems to the homes of low and modest income households and people in marginalized communities. We also need clear targets for zero emission transportation accessible and affordable to those households and communities. The transition to zero carbon home heating and transportation has the potential to drastically reduce the scourge of energy poverty in NS and make housing more affordable.

Today we are recommending changes to Bill 57 to include these clear targets for low and modest income households and marginalized community members.

The Affordable Energy Coalition

I am speaking for the Affordable Energy Coalition. Our members work with people whose electricity and heat are threatened by disconnection; we work with low income households who spend more than 6% of income on home energy which they simply can't afford to pay; we work with people who often struggle with impossible choices – should I pay energy bills or pay for other essentials like food and medicine and rent? We have been seeking systemic changes to make energy affordable since the early 2000's– for instance through free energy retrofits provided by the HomeWarming program or low cost energy retrofits for rental properties serving low income tenants through Efficiency Nova Scotia's Affordable Multi-family Housing Program. Many of you will be familiar with the vital help those programs provide to your constituents.

Energy Poverty in Nova Scotia

Nova Scotia has one of the highest electricity costs in Canada primarily due to our long reliance on fossil fuels. About 60% of our homes heat with expensive oil. We also have lower household incomes. This combination of high energy costs and low incomes leads to Canada's third highest level of energy poverty – i.e. people spending over 6% of income on home energy. One national study estimates 37% of NS households or about 147,00 households experience energy poverty.[1] Our estimate is lower after excluding higher income households paying over 6% of income on energy and for other reasons, but the number is substantial.

The Challenge and the Promise of the Transition to a Zero Carbon Economy

We must transition to a zero carbon economy. The exciting thing about this transition is that it will lead to lower energy bills for all households – for home heating and for transportation. It will lead to more comfortable, healthier homes. Having high energy poverty in Nova Scotia means that dramatically increased efficiency and switching to highly efficient heat pumps or zero carbon heating will reduce energy poverty here more than almost anywhere else in Canada.

The difficulty for low and modest income households is getting from here to there. The cost of making the transition to zero carbon heating and transportation will stop low income households and marginalized communities from making the transition and from benefitting from lower cost energy **unless governments provides the support required.** The HomeWarming program and Efficiency Nova Scotia's Affordable Multi Family Housing Program are excellent programs designed to provide that kind of support. With this targeted support, low- and modest-income households will have lower energy costs as long as they get the help they need to transition to zero-emission heating and transportation. Targeted support must also extend to supporting those living in rural areas to recognize the value of rural areas can have on environmental sustainability and create actions and goals that are relevant to them. For instance, zero emission transportation looks different in rural areas compared to urban areas.

Bill 57 vs EGSPA

The government said it wanted this bill to continue the good work done by an earlier Progressive Conservative government in 2007's Environmental Goals and Sustainable Prosperity Act (EGSPA). I have personally praised EGSPA countless times over the years for its specific goals that drove real change implemented by governments of 3 different parties. The PC party has good reason to be proud of this legislation that received unanimous support in the legislature.

Unfortunately Bill 57 doesn't deliver the same kind of clarity as EGSPA did. In EGSPA, there were 21 goals, 75% were about clearly stated targets and all had well defined deadlines with most being within 5 years. Bill 57 has a smaller percent with clearly stated targets and several have no defined deadline.

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[1] *Energy Poverty in Canada: a CUSP backgrounder (October 2019) – based on a study by Maryam Rezaie*

[As an aside, I find it confusing determining what elements of EGCCRA are goals and what are not. The government says there are 28 goals. I counted 36 items that seemed to be described as goals. It would help to clarify this.]

Strengthening Bill 57 with ambitious goals for home efficiency

We were looking to Bill 57 to set ambitious goals for requiring home efficiency and electric or zero emission home heating as well as transportation for all households and especially for low and modest income households and for marginalized communities. In clause 7b, Bill 57 mentions these ideas but doesn't set ambitious goals or deadlines. It promises to work on this but doesn't make any real commitments.

Recommendation 1:
Goal 7b: Add clearly defined targets and deadlines for efficiency programs, especially for low and modest income households and marginalized communities

Goal 7b says: "to support, strengthen and set targets for energy efficiency programming while prioritizing equitable access and benefits for low income and marginalized Nova Scotians;"

We recommend that goal 7b be changed to read:

"to strengthen energy efficiency programs so that

- **all new public and non-profit homes will be net zero energy ready and have electric or zero carbon heating systems;**
- **all existing public and non-profit homes will have deep energy retrofits and electric or zero carbon heating systems by 2030;**
- **all homes owned by low and modest income homeowners or rented to low and modest income households, will have deep energy retrofits and electric or zero carbon heating systems installed by 2030 with 50% completed by 2026**
- **2.5% of all existing homes will have net zero energy ready retrofits per year starting no later than 2030; and**
- **ownership documentation will not be a barrier to meeting these targets in African Nova Scotian communities"**

Explanation: See above. We are encouraged that this new government is committed to strengthening efficiency programming, especially for low income and marginalized communities. But we are dismayed by the lack of targets in the proposed Act. The revised goal we are recommending will go a long way to eliminating energy poverty while reducing Greenhouse Gas Emissions. This must be accomplished through a combination of the programs referred to here and the stronger building codes referred to in Recommendation 2. The 2.5%/year retrofit recommendation is from The International Energy Association.

Recommendation 2:
Goal 7e: Expand building energy standards for all homes

Goal 7e says: to adopt the 2020 National Energy Code for Buildings within 18 months of it being published by the Government of Canada;

We recommend that goal 7e be changed to read:

> **"to adopt the 2020 National Energy Code for Buildings and the National Building Code within 18 months of their being published by the Government of Canada and to require all new residential buildings to be net zero energy ready and to have electric or zero carbon heating starting no later than 2025;"**

Explanation: National Building Code section 9.36 contains energy efficiency standards for homes and small buildings. The National Energy Code for Buildings applies to other buildings. Adopting the National Building Code rapidly is as important as adopting the National Energy Code for Buildings.

The 2020 national codes include stepped or tiered levels of energy efficiency, rising in several steps to Net Zero Energy Ready as the highest standard. It is essential that Nova Scotia adopt the highest standard, Net Zero Energy Ready. The Pan-Canadian Framework on Clean Growth and Climate Change included a goal for all new buildings to be "net zero energy ready" by 2030 and the International Energy Agency says all new buildings must be "net zero carbon ready" in all countries by 2030 and we must retrofit existing buildings to this standard at 2.5% per year by 2030.[2] We believe Nova Scotia can and must be a leader in this.

About 26% of Nova Scotia's GHGs are from residential buildings.[3] Efficiency is the best method of reducing GHGs from homes and it also creates local employment and healthier, more comfortable homes. The savings in annual energy costs in Nova Scotia are high enough to pay for the increased costs of construction. The building industry must be transformed to be able to accomplish this, which will help in accomplishing our first recommendation as well.

Recommendation 3: Public zero emission transportation

Goal 7j reads: to develop and implement a zero-emission vehicle mandate that ensures, at a minimum, that 30% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030;

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[2] Net Zero by 2050 – A Roadmap for the Global Energy Sector – International Energy Association, May 2021 - Pg 148.

[3] Canada's Energy Regulator – NS Profile 2018 - https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-nova-scotia.html

We recommend that goal 7j be amended to read:

to develop and implement a zero-emission vehicle mandate

- that ensures, at a minimum, that 30% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030; and
- **that requires all new public transit vehicles and regulated intercity vehicles will be zero emission by 2022.**

Explanation: Transportation uses 43% of end use energy in Nova Scotia and creates 31% of Nova Scotia's GHGs. It is our 2nd largest sector contributing to GHGs. We support the proposal to zero emission vehicle mandate but it is important that public transit leads the way in the transition to zero carbon emissions and that it remain accessible in cost to low and modest income Nova Scotians.[4]

We applaud goal 9b on active transportation as a vital element in making zero-carbon transportation options available to low and modest income and marginalized communities.

Recommendation 4:
Section 8: Add addressing energy poverty to the Climate Action Plan for Clean Growth

Add to Section 8, between c and d:

- **"c - making net zero energy ready homes and zero carbon heating and transportation affordable to low and modest income and marginalized households" and**
- **change the existing c to d.**

EXPLANATION: This must be a primary focus in the new Climate Plan, to implement goals 7b and 7j as we have re-worded them.

Recommendation 5: Environmental Racism and Equity

Goal 17 currently reads: The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities to create a sustained funding opportunity for climate change action and support for community-based solutions and policy engagement.

We recommend changing goal 17 to read:

The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities

[4]See footnote 2.

- **to create a sustained funding opportunity for climate change action and support for community-based solutions and policy engagement, as part of a commitment of 40% of climate change spending being directed at low and modest income and marginalized communities;**
- **To measure the health impacts of toxic sites, radon and arsenic on all existing marginalized and low income communities by 2025 and to mitigate them by 2028.**

EXPLANATION: California mandates a high percent of its climate funding go to low income communities. Nova Scotia has done well so far in spending funds from the Green Fund created under the Cap and Trade system, but there is no established minimum. We believe this makes sense. Environmental Noxiousness, Racial Inequalities and Community Health Project (ENRICH) as documented the existence of environmental racism in Nova Scotia. It is time to establish a goal to mitigate its effects.

Recommendation 6: Higher, firmer, clearer ambition in our overall goals

Our members are deeply concerned about climate change, just as other Nova Scotians are. We have heard the calls by scientists and seen the unpredictable destructive effects of too little action to reduce Greenhouse Gas emissions.

The Affordable Energy Coalition supports the calls by other groups, including some of our members, for higher, clearer ambition in this Act including

- a 58% reduction of GHG's below 2005 levels (6a)
- 90% renewable electricity by 2030 (7l);
- no new fossil fuel developments (offshore or onshore oil or gas exploration, development or storage; LNG; or gas generation of electricity);
- a stronger accountability mechanism with annual reporting on progress by an independent agency; and
- changing to earlier deadlines with mandatory measures in other goals.

The proposed act is a welcome improvement compared to recent laws – in particular, creating the goals of 80% renewable electricity and closing coal plants by 2030 and putting the goals into law instead of regulation. But it doesn't meet the requirements of the climate emergency we are facing. We support the statements by the Climate Emergency Unit which you heard earlier today.

CONCLUSION

The Affordable Energy Coalition applauds the government for increasing Nova Scotia's climate ambitions but we urge you to adopt our 6 recommendations in order to fulfill the promise of eliminating energy poverty as part of the necessary transition to a zero carbon economy.

Thank you

Brian Gifford
Chair, Affordable Energy Coalition

Proposed change to Goal 16(e) of the Environmental Goals and Climate Change Reduction Act

For Law Amendments Committee regarding Bill 57

From Karen McKendry

Goal 16:

"The Government's goals to support business, training and education are:

(e) to promote and support climate change education and sustainability through the knowledge and teachings of Netukulimk and environmental stewardship with ongoing curricula renewal, the development of inclusive and accessible resources and professional learning that incorporates diversity and honours Etuaptmumk."

Recommended changes:

1. Change "climate change education" to "**environmental education including climate change education**."

2. Change "with ongoing curricula renewal" to "**through immediate curriculum changes at all grade levels.**"

What is environmental education (EE)?

- "A process that allows learners to explore environmental issues, engage in problem solving, and take action to improve the environment" (USEPA)
- "It ensures all students will have many opportunities to acquire the knowledge, skills, perspectives and practices they need to become environmentally literate citizens." (Ontario MOE)
- "Environmental education raises awareness of issues impacting the environment upon which we all depend, as well as actions we can take to improve and sustain it." (Project Learning Tree)

Why have EE in school curricula?

Some of the well-studied benefits of EE are:

- EE can deeply engage students in their learning, showing them applicability of their knowledge and skills into their everyday lives and communities.

- EE is cross-curricular, and can be part of teaching in many subject areas (e.g., math, language arts, social science, physical education, science).

- EE has been proven to improve test scores.

- EE can be an excellent way to incorporate Indigenous world views and ways of knowing into students' learning journeys.

- EE is the key to addressing the twin crises of climate change and biodiversity loss.

Where's EE in the Nova Scotia curriculum?

- EE is not officially included in the Nova Scotia curriculum. Currently, interested, resourceful individual teachers work aspects of environmental education into their practice, and ingenious not-for-profits and other groups create "curriculum-linked" resources where they can.

- EE does not go against any of the goals of the Atlantic Canada Framework for Essential Graduation Competencies. In fact, incorporating EE would be in-line with learner objectives in the framework, and would support current initiatives to include more inquiry-based learning and place-based learning in classrooms (something that EE is well suited to).

What are barriers to adding EE to the curriculum?

- In examinations of barriers for teachers in incorporating EE into their practice, the most common challenges are lack of resources, time constraints and heavy workload, and lack of institutional support. These barriers already have partial solutions in Nova Scotia.

    - There is a wealth of both EE classroom resources, and resource people, available to Nova Scotian teachers already, but many teachers are unaware of these resources at their fingertips.

    - EE can be quite cross-curricular, addressing outcomes across several subject areas through one resource or lesson, thereby reducing preparation workload for integrated curriculum teachers.

Has integrating EE into curriculum been successful in other places?

- Yes! Ontario enacted a policy in 2009 to guide incorporation of EE into *all grades* and in *all subjects*. They crafted a set of Standards for Environmental Education, and incorporated learner expectations for every grade level, and every subject, by 2017.

- Yes! In 2008, the British Columbia Ministry of Education developed curriculum maps to aid in teaching environmental learning *and environmental experiences* across all grade levels.

- Both Ontario and BC introduced teachers to networks that support bringing EE into the classroom (Ontario = OSEE and BEAN, BC = EEPSA). There are similar networks in other provinces (including Nova Scotia, the ESEC), and nationally, EECOM).

To help create the citizens of tomorrow, who truly understand and strive towards sustainable prosperity, we need to provide young learners with a journey that teaches them about the environment, lets them explore their connections to it, and equips them with the skills take action in favor of sustainability, wherever they go.

Presentation to the Law Amendments Committee

Re: Bill 57: Environmental Goals and Climate Change Reduction Act

November 1st, 2021

Caroline Beddoe

Hello, my name is Caroline. I am a 23-year old settler here on unceded Mi'kmaq land. I am here today to speak to you as a youth in this time of climate emergency, but also as a member and representative of the Blomidon Naturalists Society, from the eastern Annapolis Valley.

The BNS currently has over 150 members (individuals and families), united by a keen interest in and appreciation for the natural world. Naturalists know the shifting stories of our ecological landscapes, and this connection that we have with the natural world propels us to demand action. We need strong policies on biodiversity and conservation, and climate action. We are a signatory of the joint response to this act, organized by the Climate Emergency Unit. And I come here today to outline our response to Bill 57: Environmental Goals and Climate Change Reduction Act.

First, we would like to say that, overall, Bill 57 is welcomed for its wide range of targets, and it must pass. Although it is tabled by the PC government, climate change and the environment are not partisan issues, and all parties must support this bill.

In particular, we applaud goal **10 (a)** regarding the protection and conservation of land and water as an important step in addressing the biodiversity crisis. I also welcome the focus on equity, however wonder where the discussion on environmental racism and a just transition to support jobs and all workers as we move away from a fossil fuel economy is… Indeed, there are other missing pieces and this bill must be stronger.

This bill states that "climate change is recognized as a global emergency requiring urgent action." Yet it is vague in places, missing key components, and lacking the urgency to truly respond to an emergency.
We call for:
1) more robust climate goals,
2) shorter and defined timelines for implementing change,
3) stronger accountability, and
4) collaborative approaches amongst all parties to ensure effective climate action.

1) More robust and urgent climate goals.

This bill needs stronger climate goals and greenhouse gas emissions targets (in section 6 of the bill) to better respond to the urgency of the climate and biodiversity crises:

6 (a): While we appreciate that **goal 6 (a)** is the most ambitious climate target in Canada, it still isn't enough. The only benchmark we should be comparing ourselves to is the science. We ask

that the target for 53% reduction of emission below 2005 levels by 2030 be **increased to a 58% reduction**, which is needed to be in line with our fair share of emissions reductions to keep warming below 1.5 degrees. Exceeding 1.5 degrees puts us into unknown and dangerous feedback loops and tipping points. We need a target that will honour the need to protect lives.

6 (b): With respect to **goal 6 (b),** we need *true* zero, not *net* zero emissions. Greenhouse gas removal technology is uncertain, expensive and should not be our main plan of action. This is a climate emergency, we need to make a plan to be at true zero by managing and mandating a rapid and just transition away from fossil fuels.

2) Shorter and defined timelines for implementing change.

Bill 57 has many positive goals, but that require swifter action and defined timelines to be effective and appropriate to the urgency of the climate crisis and environmental issues of this province.

First, we ask for swifter action on ecological forestry, as outlined in **goal 10 (c).**
We are pleased to see a goal to implement ecological forestry management in line with the Lahey report, **but it must happen before 2023.** Our forests, biodiversity and species at risk, such as the critically endangered mainland moose, cannot wait another two years. It has already been three years since this report was completed. We cannot continue to push off implementation while clearcutting persists. The Lahey report is imperfect, especially with regards to glyphosate, but it has many valuable goals to implement. This goal 10 (c) must happen sooner, or a moratorium on harvesting from Crown lands should be put in place until a plan is made.

Moreover, we call for the strategic plan, "Climate Change Plan for Clean Growth," as outlined in **8(1)** to be released as soon as possible, before the end of 2022, since action is needed now. **This plan must contain clear interim targets and goals, and timelines** to achieve greenhouse gas emission targets (8a), to get to at least 80% renewable energy by 2030 [8(l)] (we suggest a push for 90%), and to phase out coal by 2030 [8(m)].

Most of this bill sets mandate for 2030 or later. This is an emergency. We need frequent targets set for before 2030 to ensure action happens. The sooner we phase out coal, reduce emissions and increase renewables, the better. **This strategic plan must come soon, and contain shorter timelines with mandated change and annual targets.**

3) Accountability.

A related ask is the need for stronger accountability measures in Bill 57.

We appreciate the inclusion of annual reports under section 8(2) and 21(1), however the bill lacks clarity on what will be in the annual reports. As already stated, we believe that to ensure accountability and action, the reports must not just be composed of reporting but must be clearly *active* by including evaluations, recommendations, timelines and trajectories for meeting targets (both **interim** leading up to, and the long-term goals set for, 2030 and 2050). We need the swiftest change before 2030 and if we do not meet these targets, we will not stay under 1.5 degrees of warming.

This Bill needs external accountability mechanisms to ensure urgent and effective action. We call for goal **21(2)** to be amended such that the Minister **must** seek advice from the Round Table when preparing the annual report. We would also support discussion around increased measures for external auditing of the Act's progress, such as by establishing external commissioners.

4) Collaborative approach amongst all parties.

We call on all parties to work together on this bill and in Nova Scotia's approach to the climate emergency, biodiversity crisis, and just transition for workers away from fossil fuels and into renewable energy work. These are non-partisan issues dealing with life and lives, and we welcome and call for collective work for the benefit of all.

--

I also want to say that I come to you as an individual, a 23-year-old growing up in these existential times. I feel the urgency of the climate crisis every day. It has fundamentally shaped how I live my life and the state of my mental health. It is exhausting, anxiety-inducing, depressive, ever present. I feel deep anxiety and grief for the lives of my generation, for the kids we don't know if we will have anymore, and for all the species that we have lost and are losing in this time of extinction and climate crisis. Youth like myself are grappling with intense emotions, we are reconceptualizing what is means to live, and we are out in our communities, in our streets, and online fostering radical and compassionate change, promoting alternatives, and being bold and brave even when our voices waver.

I ask you to consider these emotions. This is hard work, but we must make policies as if lives are on the line – because they are.

In these existential times, hope is psychologically imperative for survival. And hope is an action. We need action to have hope. I applaud where Bill 57 is starting to take us, and I thank you for working to represent us. But I ask you to push further. To be bolder. I ask of you to be even more courageous in these hard times - to do what is needed. I have to believe that it is possible.

This is a climate emergency after all, but it is also the possibility for *emergence* from our current destructive, extractive system towards a more compassionate, just, and resilient society that honours and protects the natural world and all life.

"Climate change is recognized as a global emergency requiring urgent action."

Please don't just tell me, show me.

Thank you.

Caroline Beddoe

NSCSW | NOVA SCOTIA COLLEGE OF SOCIAL WORKERS

Submission to Law Amendments Committee – Bill 57

Date submitted: November 1, 2021

Who We Are

The Nova Scotia College of Social Workers (NSCSW) exists to serve and protect Nova Scotians by effectively regulating the profession of social work. We work in solidarity with Nova Scotians to advocate for policies that improve social conditions, challenge injustice and value diversity.

Learn more about the College at nscsw.org/about.

Climate Justice

Social workers across the globe are committed to fighting climate change by advocating for climate justice. The NSCSW is committed to working with government to ensure that marginalized communities can share fully in the benefits of the transition to a green economy and aren't overburdened with the brunt of adjustment. **We are committed to ensuring that no one is left behind.**

Proposed Amendments to the Environmental Goals and Climate Change Reduction Act

Section 5:

> 5 (1)(d) support the well-being and quality of life of all Nova Scotians *(add to this)* **by reducing inequality and ensuring climate justice is integrated across government departments.**
>
> *Added as well should be:*
>
> 5 (1)(e) **establish, adopt, and support an interconnected approach to end environmental racism.**

Section 8

> 8 (1) The Government shall create a strategic plan that addresses.
>
> (d) clean inclusive growth (add to this) **rooted in climate justice and the reduction of inequality.**
>
> *Added as well should be:*
>
> (f) **ending environmental racism in all its forms.**
>
> *And;*
>
> (g) **a green jobs strategy focused through an equity lens to ensure that the benefits of the expected growth in permanent, full-time, high-wage green jobs are widely shared.**

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Incorporating Climate Justice.

Climate justice is crucial to the goals of the *Environmental Goals and Climate Change Reduction Act* as it grounds climate policy in a clear focus on the social and economic effects of climate change, and acknowledges **that climate change affects people differently, depending on their position in society.** Climate justice must be a clear goal within any climate policy and strategy, as the most vulnerable must not bear the burden of transition away from a carbon economy.

Ending Environmental Racism

Environmental racism refers to the disproportionate locations of industrial and other environmentally hazardous activities near to communities of colour and the working poor. Environmental racism is also characterized by the lack of organization and political power that communities hold for advocating against these big industrial polluters. Environmental racism has many negative consequences most notably it creates health inequities across racial dimensions. We have a moral and ethical obligation to ensure that environmental racism is ended and ended quickly; it must be attached to any reasonable fight against climate change.

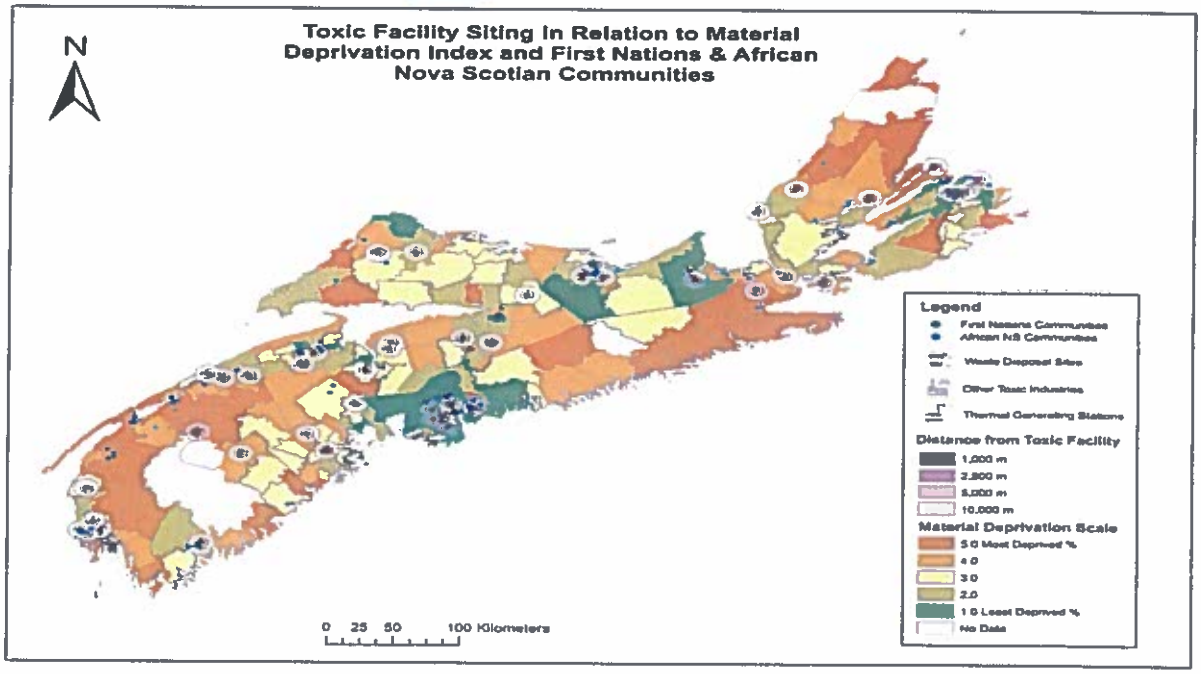

Figure 1- From -The ENRICH Project

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Reducing Inequality

To be successful in reducing greenhouse gas emissions and transitioning the economy away from fossil fuels there must be a clear focus on rising inequality. In 2018 the top 10 per cent of incomes in Nova Scotia grew to 16.3 times the income shares of the bottom 10 per cent, growing from 11.1 in 1988 (see figure 2). Rising inequality and the continued class divide between the rich and the poor has allowed the voices of the most vulnerable to go unnoticed, has eroded trust, and has increased anxiety and illness for all. This lack of trust appears to be growing. Engage Nova Scotia recently produced data demonstrating **only 27.1%** of Nova Scotians trust the provincial government. This erodes the social solidarity required to tackle large issues as it pits Nova Scotians against one another, fighting for resources perceived to be scarce rather than working together in solidarity towards the common good.

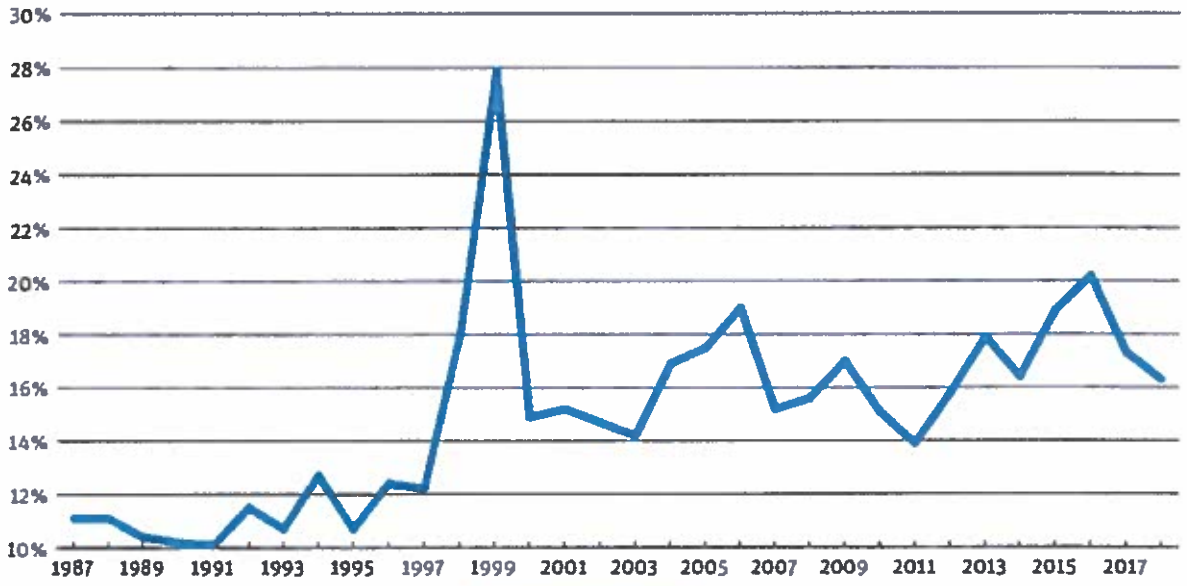

Figure 2- From *Creating the future we all deserve; A social policy framework for Nova Scotia*

Call to Action

Social workers are calling for the above amendments to *Environmental Goals and Climate Change Reduction Act,* which should be grounded in an updated vision of systemic social benefits that were envisioned for Canada in the transformative Marsh Report of 1942: a substantial social safety net to tackle the climate crisis and transition to a post carbon economy. This should be accompanied by a commitment to increase social spending by 2% of our total GDP, **a crucial fiscal policy required to reduce income inequality, end environmental racism and ensure climate justice.**

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From: Tynette Deveaux <tynetted@sierraclub.ca>
Sent: November 1, 2021 6:08 PM
To: Office of the Legislative Counsel
Cc: Gretchen Fitzgerald
Subject: Sierra Club Canada Foundation submission on Bill 57 - EGCCRA
Attachments: Sierra_Club_EGCCRA_Response.pdf

Thank you for sharing this with the Law Amendments Committee considering Bill 57.

Tynette

--

FONDATION
SIERRA CLUB CANADA FOUNDATION ATLANTIC

Tynette Deveaux (she/her)

Communications Coordinator, Beyond Coal Atlantic

Direct Line 902.719.9083

K'jipuktuk, Mi'kma'ki

Visit our website. Like us on Facebook
Find us on Twitter.

FONDATION

SIERRA CLUB CANADA

FOUNDATION ATLANTIC

An Emergency Response to Nova's Scotia's Environmental Goals and Climate Change Reduction Act

Submitted November 1, 2021

For further information, contact:

Gretchen Fitzgerald, gretchenf@sierraclub.ca
Tynette Deveaux, tynetted@sierraclub.ca

e·mer·gen·cy

-NOUN /ə'mərjənsē/

an unforeseen combination of circumstances or the resulting state that calls for immediate action.

re·new·a·ble

-NOUN /rə'n(y)o͞oəb(ə)l/

capable of being replaced by natural ecological cycles or sound management practices.

Two years ago, many of us who are here today made presentations to the Law Amendments Committee on the Sustainable Development Goals Act. We explained why we needed strong legislated targets and an action plan to respond quickly and effectively to the climate emergency. Very little came of it, except more talk and more promises. We've lost two valuable years in the fight against climate change. We need to make up for lost time.

We appreciate that this new government understands the need for legislated targets to reduce greenhouse gas emissions and increase renewable energy in the province. We believe it's necessary to drill down further to see how those targets can be both strengthened and accelerated.

But first, we're going to have to agree on the meaning of **EMERGENCY.**

Merriam-Webster defines it as **an unexpected and usually dangerous situation that calls for immediate action.** If you look up the word "Emergency" in other dictionaries, you'll find a similar definition.

In the case of the **climate emergency**, it's not really unexpected, though for years big oil and gas companies succeeded in hiding and discrediting reports about it—much like the tobacco industry hid the truth about smoking causing cancer.

Nevertheless, it's clear that an EMERGENCY **calls for immediate action**. With each goal and target in Bill 57, we must ask ourselves: *Is this in keeping with the call for immediate action? Does this reflect or contradict the meaning of emergency?*

An emergency response also involves going into uncharted territory. Imagine if anyone had told us three years ago that we'd be wearing masks and mandating vaccines and lockdowns. We would have thought you were crazy. But we did it, because it had to be done.

We're asking you to have the courage to lead once again.

In order to adequately respond to the climate emergency, EGCCRA must:

1. **Include interim targets to phase out coal, because it matters whether a plant is phased out in 2023 or 2029**

Starting to phase out coal-fired plants now, rather than in five or ten years, is essential for the province's efforts to reduce GHG emissions. It will also accelerate better health for Nova Scotians and sustainable jobs for the province.

NS Power's own modeling projections show that there is very little difference in the cost of meeting a 2030 timeline versus a 2040 timeline (allowed under Nova Scotia's equivalency agreement negotiated with the federal government); the only question is whether we want to begin paying for the phaseout today or delay it further and let our youth pay for it several years from now.

The federal government is a signatory to the international Powering Past Coal Alliance and it has mandated a deadline to get Canada off coal by 2030.

Canada and Nova Scotia must walk the talk on its coal phase-out promises. Shifting our deadline to get off coal from 2040 to 2030 is a necessary and welcome step—one that needs be taken seriously. This requires interim targets to phase out coal. It may surprise people to hear that Alberta will be shutting down its coal-fired power plants by 2023—we've got to catch up!

We know that existing hydroelectric power from Quebec is accessible and affordable to shut down 300 MW of coal-fired electricity next year. That's about one-quarter of our coal and petcoke generation.[1]

We ask that the following interim targets be legislated to ensure we achieve the necessary reductions in GHG emissions and clean up our act on coal:

Amend Section 7 (m) of Bill 57, which currently reads:

> "7 (m) to phase out coal-fired electricity generation to the Province by the year 2030"

We ask that the following interim targets be added to the legislation:

2022 - Nova Scotia will phase out 25% of its coal-fired electricity generation

2025 - Nova Scotia will phase out 50% of its coal-fired electricity generation

2028 - Nova Scotia will phase out 75% of its coal-fired electricity generation

1 How We Make Electricity, Nova Scotia Power.

2. Stop all new fossil fuel exploration and production in Nova Scotia

This year, the International Energy Agency released its 2021 *Global Energy Review*, which makes it very clear that no new fossil fuel exploration or production can be permitted if we are to meet global energy needs.

In August, the IPCC released a *Special Report*, which has been dubbed a "code red for humanity." The 2021 UN Environmental Programme *Production Gap Report* also states that fossil fuels must remain in the ground in order to have a chance to have a safe and liveable planet.

The province of Quebec has just committed to stopping all new fossil fuel exploration and production. British Columbia and New Zealand have banned new permits for offshore oil and gas exploration and drilling. Denmark and Costa Rica are championing the Beyond Oil and Gas Alliance.

We must keep fossil fuels in the ground.

At current rates of production, the world is on track to produce twice the volume of fossil fuels that would keep us within the 1.5 degrees of warming by 2030. Nova Scotia can be part of the solution. It can stop extracting fossil fuels, including offshore oil and gas. The oil and gas reserves currently promoted by Nova Scotia—if extracted and burned—would eat up 4% of the world's carbon budget.[2]

Right now, there is very little offshore oil drilling occurring in the province. We can afford to take this important stand against climate change.

2 Based on methodology in Paris to Projects Research Initiative. University of Waterloo. https://uwaterloo.ca/applied-sustainability-projects.

Polling conducted in Nova Scotia in May 2021 shows that over 85% of Nova Scotians support a shift away from fossil fuels and support for affected workers. This was clearly demonstrated by the successful campaign to halt the construction of the Alton Gas natural gas storage caverns, the mass mobilization of Nova Scotians against fracking, and the opposition to the Goldboro LNG project.

Nova Scotians do not want fossil fuels contaminating healthy waters, infringing upon Indigenous rights and laws, spending tax dollars that are needed for healthcare and other important programs, and cutting off the path to a safe environment.

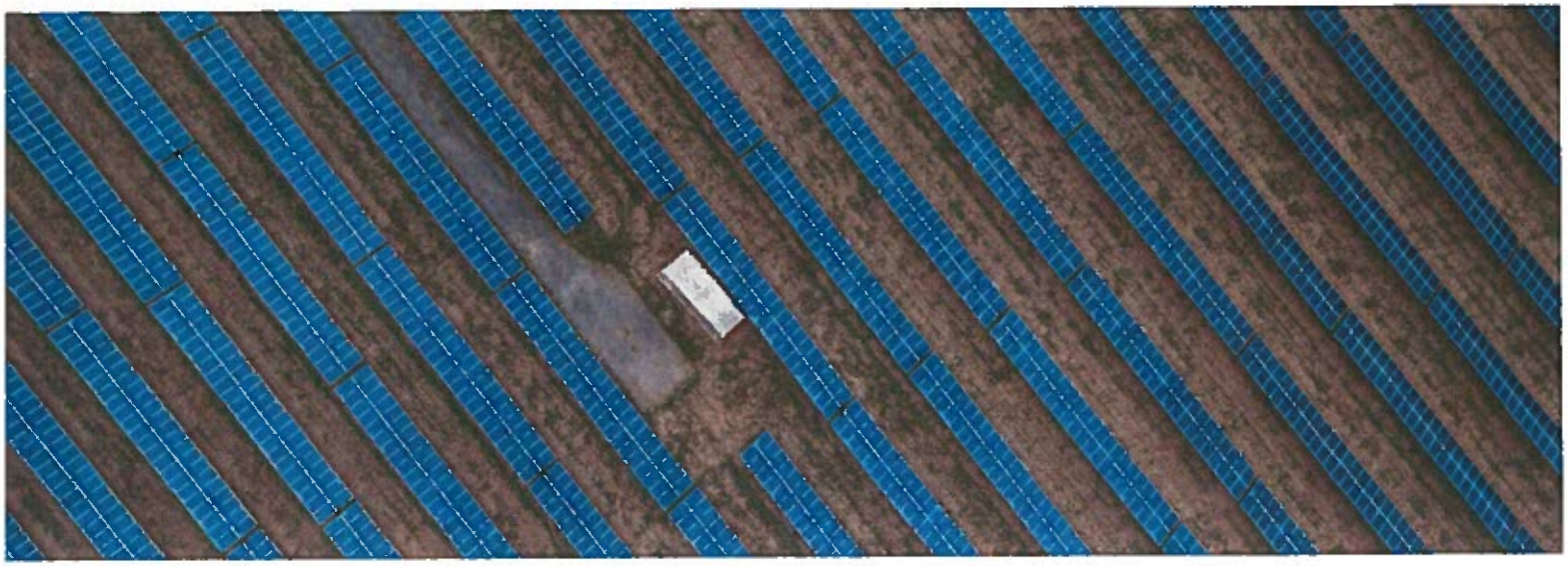
In the case of offshore oil and gas, projects started now would have an expected lifespan of decades. A commitment to halt oil and gas drilling now would signal Nova Scotia's climate leadership.

We ask that you:

Add the following commitment to Bill 57 under a new subsection in section 7:

> 7 (n) to prohibit all new offshore oil and gas activity as of January 1, 2022, and to phase out all offshore oil and gas activity by January 1, 2025.

We also ask that Nova Scotia join the global Beyond Oil and Gas Alliance to show its commitment to reducing global greenhouse gas emissions.



3. 80% electricity from renewable sources by 2030 simply isn't enough

Bill 57 needs more ambitious goals for renewable energy. Nova Scotia has tremendous potential for renewable energy. According to a 2018 study, Nova Scotia could generate 62% of its energy from on- and off-shore wind alone. Yet as of 2021, Nova Scotia Power only generates 18% of its energy from wind.

We also have a lot of untapped solar potential. The city of Halifax alone has a greater annual solar PV (photovoltaic) potential than Freiburg, Germany, which is known as Europe's "solar city."

We know that municipalities in Nova Scotia are actively seeking ways to participate in clean energy to meet their own climate targets. Yet Nova Scotia Power continues to put up roadblocks to distributed energy systems. Increasing Nova Scotia's renewable energy targets would help bring about the conversations needed to remove those roadblocks.

We ask that you amend the Bill so that Section 7 (l) reads as follows:

> 100% of the province's electricity is generated from clean renewable sources by 2030.

And that interim target dates be added as follows:

> 75% of the province's electricity is generated from clean renewable sources by 2025.

We also ask that renewable energy be defined in Bill 57 to include only those energy sources that will reduce GHG emissions and fully adhere to the criteria of a circular economy and Netukulimk, as currently defined in the bill.

4. Forest biomass for electricity is not a renewable energy source

If we're going to *actually* respond to the climate emergency, we need to get beyond make-believe climate solutions, such as forest biomass—and we need to get the math right.

Burning forest biomass for electricity generation actually emits more GHG emissions than burning coal—in fact, it produces approximately one-and-a-half times more greenhouse gases.

The use of biomass to generate electricity has boosted demand for low-quality wood and wood waste in the province, resulting in an increase in clearcutting, deforestation, and biodiversity loss.

> "It takes more than 30 tractor-trailer loads of wood a day to feed Nova Scotia Power's Port Hawkesbury biomass plant."[3]

Emissions from the Port Hawkesbury and Liverpool biomass power plants are *not* included in the province's GHG emissions accounting. That *must* be corrected.

Not only does forest biomass energy run counter to Nova Scotia's commitments to reduce GHG emissions and protect healthy forests and biodiversity, but it also increases ratepayers' electricity costs.

For something to be renewable, it must be renewable within our lifetimes. Currently, less than one percent of forests in the province are over 100 years old. It will take 150 years for old growth Acadian-Wapane'kati forests to grow back. We have transformed our forests from carbon sinks to carbon emitters. This needs to stop NOW.

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3 MIT expert: Carbon-neutral biomass 'accounting fraud', The Chronicle Herald, November 5, 2018

We ask that

Forest biomass be phased out in 2022

Renewable energy be defined in the Act, and that forest biomass for electricity generation not be included as a renewable until the majority of forests in NS are once again mature old-growth forests.

The province begin counting GHG emissions derived from burning forest biomass to generate electricity—and from clearcutting the province's forests. These must be included in our total GHG budgets.

5. No new natural gas

Natural gas is currently being touted as the ideal bridging source of power between fossil fuels and renewables. We need to clear some things up:

- Natural gas *is* a fossil fuel
- The main component of natural gas is methane, which warms the planet 84 times faster than CO2—and in a very short period (less than 10 years)
- Methane leaks from natural gas production and distribution, including fracked gas, are a major contributor to global warming

Delaying the transition to clean renewables by building natural gas power plants will set us back years and supersize our GHG emissions with methane.

We ask that the Act:

Require the phase-out of natural gas power-generating stations by 2030

Allow no new natural gas-generating stations

6. No new mega-hydro projects

Mega dam hydro projects contaminate local waters, soils, and fish populations. These large-scale projects produce methylmercury, which poisons local food supplies and the people that eat them; most often, these are Indigenous peoples.

Hydropower plants contribute to climate change through the release of methane when large areas of organic material are flooded and begin to decay.

Stopping the natural flow of rivers for mega hydro projects infringes on traditional territories of Indigenous peoples and is a threat to Indigenous rights, health, culture, and the livelihoods of downstream communities.

Small-scale hydro projects (plants that produce less than 30 MW) are much more manageable and have far fewer impacts on the environment and climate.

We ask that

The Act include only small scale hydro projects (under 30 MW) as renewable hydro energy

The province commits to no new environmentally destructive mega hydro projects, such as the proposed Gull Island Project in Labrador, which would be integrated into our energy grid via the Atlantic Loop.

The province commits to opposing any future power generated by small modular nuclear reactors in the Atlantic Loop

Concluding Remarks

We know that what we're asking of you today is not easy to do, but we know you can do it—we saw it with Nova Scotia's response to the Covid-19 pandemic. Nova Scotians are ready to rise to the occasion, but we need our government to lead.

Healthy Forest Coalition

Presentation to Law Amendments Committee:
Bill 57 - Environmental Goals and Climate Change Reduction Act
Nov. 1, 2021

Summary

The HFC is pleased to see many of the hard commitments and goals that are enshrined into future legislation. Overall, there is much to commend within this Bill. In particular, the commitment to protect 20 percent of the province's land and water by 2030 is a big step in the right direction and we applaud this aspect. However, although this Bill makes good strides in land protection, it fails to adequately address the implementation of the Lahey report, and subsequent application of ecological forestry on public land in Nova Scotia.

HFC Supports:

- 20% land and water protection by 2030. This goal is a great move forward for conservation in Nova Scotia and will help bring the province closer to meeting the federal targets of 30%.

- Legislated commitments to the implementation of the Lahey Report and ecological forestry (see more below).

HFC Recommends for improvements to Bill 57:

- A clause committing to a rapid phase out of biomass as a renewable energy source. Burning biomass for the purposes of electricity generation emits more carbon than coal and has driven some of the worst harvesting practices ever seen in Nova Scotia. In large part, this is due to the impacts of the types of harvests that biomass necessitates in order to make it profitable. High efficiency biomass burning for space heating can potentially be acceptable provided the source

material only comes from sawmill residuals and not purpose-specific harvesting - but burning it for the generation of electricity does more harm than good and must end. This is the legislation that should mandate an end to big biomass in Nova Scotia.

- We would like to see an interim target set for the land protection goal of 17% by 2025

- We are beyond disappointed to see that implementation of the Lahey Report and ecological forestry has been delayed for at least two more years. The Lahey Report is over 3 years old and the Natural Resources Strategy, its predecessor, is over 10. This means that Nova Scotian's have been promised a significant reduction of clearcutting and even-aged harvesting practices for well over a decade. The costs of this delay are apparent across the province with even-aged, or clearcutt harvests still occupying the majority of treatments.

- As a bare minimum, until the Lahey Report is implemented the HFC calls for this government to:

1. Place a moratorium on clearcutting and other even-aged practices on all public land
2. Uphold the legally-binding commitments of the Endangered Species Act and identify core habitat for all relevant species

Charles Williams

Environmental Goals and Climate Change Reduction Act

Be it enacted by the Governor and Assembly as follows:

1 This Act may be cited as the Environmental Goals and Climate Change Reduction Act.

2 In this Act,

(a) "circular economy" means an economy in which resources and products are kept in use for as long as possible, with the maximum value being extracted while they are in use and from which, at the end of their service life, other materials and products of value are recovered or regenerated;

(b) "core active transportation network" means a central and connected network of active transportation facilities for walking, biking or rolling to and from key community destinations;

(c) "equity" means the recognition of people's differences and the attempt to counteract unequal opportunities by considering fairness and justice;

(d) "Etuaptmumk" means, as defined by the Mi'kmaq, two-eyed seeing;

(e) "extended producer responsibility" means an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of its life cycle;

(f) "Fund" means the Sustainable Communities Challenge Fund established under Section 18;

(g) "green business" means an enterprise that prioritizes sustainability principles and socially responsible behaviour in its business model and takes into consideration its impact on the well-being of both the natural world and society;

(h) "Minister" means the Minister of Environment and Climate Change;

(i) "Netukulimk" means, as defined by the Mi'kmaq, the use of the natural bounty provided by the Creator for the self-support and well-being of the individual and the community by achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity or productivity of the environment;

(j) "Round Table" means the Round Table established pursuant to the Environment Act;

(k) "sustainable development" has the same meaning as in the Environment Act;

(l) "sustainable prosperity" means prosperity where economic growth, environmental ~~stewardship~~ Restoration and social responsibility, and Reparations are integrated and recognized as being interconnected.

3 The Minister is responsible for the general supervision and management of this Act and the regulations.

4 This Act is based on the following principles:

(a) the achievement of sustainable prosperity in the Province must include

(i) Netukulimk,

(ii) sustainable development,

(iii) a circular economy, and

(iv) equity;

(b) the achievement of sustainable prosperity is a shared responsibility among all levels of government, the private sector and all Nova Scotians;

(c) climate change is recognized as a global emergency requiring urgent action; and

(d) such others as may be prescribed by the regulations.

5 (1) The long-term objective of the Government is to achieve sustainable prosperity.

(2) To achieve its objective of sustainable prosperity, the Government shall

(a) establish, adopt, support and enable goals that foster an integrated approach to environmental sustainability and economic well-being;

(b) raise awareness of the importance of sustainable prosperity and the climate change emergency and the elements that contribute to them;

(c) encourage the growth of the clean economy and work to support all Nova Scotians in benefiting from its growth;

(d) support the well-being and quality of life of all Nova Scotians;

(e) create conditions necessary for making progress toward sustainable prosperity, including regulation, programs and initiatives that encourage actions and innovation by local government, business, non-government organizations and Nova Scotians; and

(f) work toward continuous improvement in measures of social, environmental and economic indicators of prosperity.

6 The Government's targets for greenhouse gas emissions reductions are

(a) by 2030, to be at least 6053% below the levels that were emitted in 2005; and

(b) by 2050, to be net zero, by balancing greenhouse gas emissions with greenhouse gas removals and other offsetting measures.

These need to be more aggressive with interim benchmarks
2025=45%
2030=60%
2040=90%
2050=net zero carbon

7 The Government's goals with respect to climate change mitigation and adaptation and the reduction of greenhouse gas emissions are

(a) to complete and release a Province-wide climate change risk assessment by December 31, 2022, an update by December 31, 2025, and an update every five years thereafter;

(b) to support, strengthen and set targets for energy efficiency programming while prioritizing equitable access and benefits for low income and marginalized Nova Scotians;

(c) to work with municipalities and First Nations in the Province to take immediate and long-term action on their climate change priorities;

(d) to build climate change adaptive capacity and resilience by requiring climate adaptation planning across every Government department;

(e) to adopt the 2020 National Energy Code for Buildings within 18 months of it being published by the Government of Canada;

(f) to require any new build or major retrofit in government buildings, including schools and hospitals, that enters the planning stage after 2022, to be net-zero energy performance, net-zero Carbon, circular economy focused, and climate resilient;

(g) to encourage landlords who currently lease office space to Government to transition existing office space to meet net-zero energy performance, net zero Carbon, and circular economy focused;

(h) to prioritize leased office accommodations in buildings that are climate resilient and meet net-zero energy performance, net zero Carbon, and circular economy focused starting in 20253~~0~~;

(i) to decrease greenhouse gas emissions across Government-owned buildings by 75% by the year 20303~~5~~;

On-site fossil fuel hookups in any new construction prohibited starting in 2023.

On-site fossil fuel use or hook-us phased out, 30% of all buildings 2025 and 100% 2030.

(j) to develop and implement a zero-emission vehicle mandate that ensures, at a minimum, that ~~30%~~ 40% of new vehicle sales of all light duty and personal vehicles in the Province will be zero-emission vehicles by 2030;

Aggressively phase out fossil fuel extraction, export, exploration, or permits
50% 2022,
75% by 2025
Zero by 2030

(k) to develop and implement supporting initiatives for the goal in clause (j);

(l) to have ~~80%~~ 90% of electricity in the Province supplied by renewable energy by 2030; and

(m) to phase out coal-fired electricity generation in the Province by the year 2030 or eairler!~~.~~

8 (1) The Government shall create a strategic plan, prior to December 31, 2022, to be known as the "Climate Change Plan for Clean Growth" that addresses

(a) achieving the greenhouse gas emission targets set out in Section 6;

(b) adapting to the impacts of climate change and building a climate resilient Province;

(c) accelerating the integration of sustainable and innovative technologies and approaches; and

(d) clean inclusive growth.

(2) The Government shall release annual progress reports on the plan outlined under subsection (1) and review and renew the plan within five years of its release.

9 The Government's goals with respect to active transportation are

(a) to establish a Provincial Active Transportation strategy to increase active transportation options by 2023; and

(b) to complete core active transportation networks that are accessible for all ages and all abilities in 65% of the Province's communities by 2030~~,~~ and 100% by 2050

10 The Government's goals with respect to the protection of land are

(a) to conserve at least 20% of the total land and water mass of the Province by 2030 as protected areas and other effective area-based conservation measures, including Indigenous Protected and Conserved Areas, in a manner consistent with national reporting criteria;

(b) to support the goal in clause (a) with a collaborative protected areas strategy to be released by December 31, 2023;

(c) to implement by 2023 an ecological forestry approach for Crown lands, consistent with the recommendations in "An Independent Review of Forest Practices in Nova Scotia" prepared by William Lahey in 2018, through the triad model of forest management that prioritizes the sustainability of ecosystems and biodiversity in the Province; and

In the interim there will be a moratorium on clearcutting on public lands.

(d) to identify by 2023 the percentage allocation of Crown land dedicated to each pillar of the triad model of forest management referred to in clause (c). With and a bias for social and cultural pillars to compensate for centuries of emphasis on the economic pillar.

To promote ecosystem resilience and services though restoration of lands and coasts via reforestation, afforestation, and costal restoration.

11 The Government's goals with respect to water and air are

(a) to develop provincial water quality objectives to guide activities that affect water quality by 2026;

(b) to address and mitigate barriers Nova Scotians face to testing and treatment of rural wells by 2026;

(c) to manage the Province's air zones consistent with the Canadian Ambient Air Quality Standards; and

(d) to review and update the Province's air emission targets and ambient air quality standards by 2025 and conduct reviews and updates every five years or sooner if the Minister so directs.

12 The Government's goal with respect to environmental assessments is to modernize the environmental assessment process by 2024 taking into consideration

(a) cumulative impacts;

(b) diversity, equity and inclusion;

(c) independent review;

(d) Netukulimk; and

(e) climate change.

13 The Government's goal with respect to sustainable procurement is to demonstrate leadership in sustainable procurement by increasing innovation, sustainability, circular economy focus, diversity and inclusion in government procurement and considering community benefits attached to procurements.

14 The Government's goals with respect to aquaculture and food are

(a) to support low-impact sustainable aquaculture through a licensing process that weighs environmental considerations and includes provincial regulation for potential environmental impacts, animal welfare and fish health; and

(b) to develop a Provincial food strategy for enhanced awareness of, improved access to and increased production of local food to achieve 20% consumption of local food by 2030.

15 The Government's goal to encourage the growth of the circular economy includes, but is not limited to,

(a) expanding extended producer responsibility and reducing the use of single-use plastics;

(b) reducing solid waste disposal rates to no more than 300 kilograms per person per year by 2030; and

Support local industries focused on transitioning linear waste streams to circular economies.

(c) developing a plan, including specific actions and interim targets, by 2023 to meet the solid waste goal in clause (b).

16 The Government's goals to support business, training and education are

(a) to actively encourage innovative, sustainable and green businesses to establish or relocate to the Province and create an environment for innovative, sustainable and green business start-ups;

(b) to work with small businesses across the Province to get their input on ways to reduce emissions and sequester carbon, including through rebates, targeted investments and other supports;

(c) to work collaboratively with businesses, the Nova Scotia Community College and the labour sector to modernize apprenticeship programs to ensure the Province has the tradespeople needed to meet the demands of the clean economy;

(d) to support youth to engage in the clean economy through sustainability-based youth employment leadership programs in the Province; and

(e) to promote and support climate change education and sustainability through the knowledge and teachings of Netukulimk and environmental stewardship with ongoing curricula renewal, the

development of inclusive and accessible resources and professional learning that incorporates diversity and honours Etuaptmumk.

17 The Government's goal with respect to diversity, equity and inclusion is to initiate in 2022 ongoing work with racialized and marginalized communities to create a sustained funding opportunity for climate change action and support for community-based solutions and policy engagement.

18 (1) The Sustainable Communities Challenge Fund is established.

(2) The money in the Fund must be managed and used in accordance with the regulations to create competitive opportunities that encourage communities in their climate change mitigation and adaptation efforts.

19 The Premier shall meet with the Round Table annually to discuss progress on sustainable prosperity and may include at the meeting any member of the Executive Council the Premier deems appropriate.

20 The Premier shall ensure that sustainable prosperity is included in the mandate of every Government department.

21 (1) The Minister, in consultation with such members of the Executive Council as the Minister deems appropriate, shall report annually to the House of Assembly on the progress made toward the long-term objective of sustainable prosperity, including progress toward achievement of sustainable prosperity goals and initiatives established pursuant to this Act.

(2) In preparing the annual report referred to in subsection (1), the Minister may seek advice from the Round Table.

(3) The Minister shall table the annual report referred to in subsection (1) in the House of Assembly on or before July 31st of the year in which it was completed or, where the House is not then sitting, file it with the Clerk of the House.

22 The Minister shall request the Round Table to carry out a public review of this Act and the regulations

(a) no later than five years after this Act comes into force; and

(b) at any other time the Minister considers appropriate.

23 (1) The Governor in Council may make regulations

(a) setting additional goals to achieve sustainable prosperity consistent with the principles and focus areas established pursuant to this Act;

(b) establishing further principles to achieve sustainable prosperity;

(c) respecting initiatives to achieve sustainable prosperity consistent with the principles established pursuant to this Act;

(d) respecting the acquisition of money for the Fund;

(e) respecting the management and use of money in the Fund;

(f) governing reporting and record-keeping requirements for any purpose related to this Act;

(g) respecting the information and content required for the climate change risk assessment referred to in clause 7(a);

(h) defining any word or expression used but not defined in this Act;

(i) further defining any word or expression defined in this Act;

(j) respecting any matter that the Governor in Council considers necessary or advisable to carry out effectively the intent and purpose of this Act.

(2) The exercise by the Governor in Council of the authority contained in subsections (1) is a regulation within the meaning of the Regulations Act.

24 Chapter 7 of the Acts of 2007, the Environmental Goals and Sustainable Prosperity Act, is repealed.

25 Chapter 26 of the Acts of 2019, the Sustainable Development Goals Act, is repealed.