



Registered Nurses' Association of Ontario (RNAO)

Submission on *Ontario's Climate Change Discussion Paper 2015* (EBR posting 012-3452)

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The Registered Nurses' Association of Ontario (RNAO) is the professional association for registered nurses, nurse practitioners and nursing students who practise in all roles and sectors across Ontario. RNAO welcomes the release of *Ontario's Climate Change Discussion Paper 2015* as an important step towards the radical transformation necessary to meet Ontario's greenhouse gas targets. While the province's contribution to greenhouse gas (GHG) emissions is less than many other jurisdictions, it can continue to play a key leadership role to demonstrate what is possible to the rest of the country and to the rest of the world. Already, Ontario has led the way by shutting down the heavily polluting coal plants that also produced large volumes of greenhouse gases relative to the amount of electricity produced. However, we remain large per capita emitters, so we have a long way to go.

We greatly appreciate the opportunity to provide feedback. We are also pleased to respond to the specific questions posed in the discussion paper (Appendix A).

The Urgent Need for Action

As the discussion paper points out, climate change is very real -- happening today, not in a distant future -- and is a result of human activity that increases the amount of greenhouse gases in the air. This activity has radically changed the composition of the atmosphere. The carbon dioxide concentrations have risen steadily since the start of the industrial era, when they were about 280 ppm.¹ Recent estimates have put concentrations over 400 ppm.² That is a 43 per cent increase. The jump is unprecedented and the levels of carbon in the air far exceed those at any time in the last 800,000 years; the previous high over that period was 300 ppm about 330,000 years ago.³ This is alarming. When other greenhouse gases besides CO₂ are factored in, the increase is even more worrisome -- about 60 per cent from the start of the industrial era by 2012 alone.⁴

There is no dispute about the science, which paints an increasingly compelling picture of a bleak future unless strong action is taken. Appendix B to this paper contains some of the key conclusions of the authoritative Intergovernmental Panel on Climate Change about global effects of climate change. Effects in vulnerable parts of the globe have been severe, but the Ontario discussion paper notes that our province is also experiencing significant climate effects, including severe ice storms and flooding, as well as dramatic warming in the far north. This is not just a matter of global justice -- it is a matter of self-preservation and survival.

Registered Nurses, nurse practitioners and nursing students see this as a major health issue. By itself, reducing GHG emissions is essential to avoiding climate

catastrophe, which would be disastrous for everyone, because whole regions would experience mass disruption and displacement of people. In addition to avoiding the unthinkable, there will be huge co-benefits to reducing emissions: improved air quality; more walkable and bikeable communities; improved transit; better connected communities; and protection of green spaces, as carbon dips will make for healthier human and natural environments.

The Ontario Climate Change Plan

Ontario must, at a minimum, hit its emission reduction targets of 15 per cent below 1990 levels by 2020 and 80 per cent below by 2050.⁵ This implies an ambitious across-the-board approach with rapid implementation. **To be serious, a greenhouse gas reduction perspective must be integrated into policy in all relevant areas, including across all ministries.** Ontario's proposed short-term plan includes the following:

- Carbon pricing
- Actions in key sectors
- Support for science, research and technology
- Promotion of climate resilience and risk management

RNAO supports effective measures in all the above areas. A comprehensive approach is necessary.

Carbon Pricing

The most essential step is to put an effective price on carbon. Right now, we do not have that. As the mandate letter for the Minister of the Environment and Climate Change requests, the Minister is to put greater emphasis on the "polluter pays" principle.⁶ This is very sound economics, as it corrects for a major market failure: when people do not have to pay for damages they cause, they have an artificial incentive to do more of those damaging behaviours. Making polluters pay for the damage they cause gets rid of a de facto subsidy of their harmful activity. This can be a very effective way of addressing pollution, and it helps to make a more equitable and just society by making those who cause environmental injury pay for that injury. Those payments can help remediate the injury. A comprehensive polluter-pay approach is elaborated for many kinds of Canadian environmental issues by Canada's Ecofiscal Commission.⁷ A look at the Commission's advisory board shows its remarkable political breadth, indicating how mainstream the concept has become.

There is broad consensus in favour of carbon pricing, which is an example of polluter pay. It would serve several functions:

- It would be a signal to consumers to make less use of products that are more carbon-intensive.
- It would be a signal to producers to use inputs that are less carbon-intensive.
- It would provide incentives to investors and innovators to find and/or develop methods for reducing carbon emissions.
- It would provide an important source of revenue to help solve the problems created by dirty energy.

As the discussion document says, there are several approaches to carbon pricing. In its submission on Bill 185, *the Environmental Protection Amendment Act (Greenhouse Gas Emissions Trading), 2009*,⁸ RNAO argued for a **carbon tax** over the major alternative, **cap-and-trade** (the latter entails issuing and/or selling permits to emit greenhouse gases, which holders could buy and sell; this is a kind of emissions trading system) on the following grounds:

- It is simpler and quicker to set up, as it can use the existing tax system.
- It is cheaper to administer.
- It is easier to cover more types of emissions.
- It would yield more revenue, to the extent that cap-and-trade permits are not fully auctioned.
- It would reduce the risk of gaming and cheating under cap-and-trade if permits are not fully auctioned.
- It can be easily phased in through escalating carbon tax rates.
- To the extent that cap-and-trade permits are given to existing firms, that would act as a barrier to entry for new firms. It also would perversely reward bigger polluters with more permits.

Proponents of cap-and-trade generally do not dispute the advantages of a carbon tax or a carbon fee as it is also known. Rather, they argue that in a political environment poisoned against new taxes, an emissions trading system is more politically saleable. This option is second-best, but if the government is to proceed with cap-and-trade, it must do so in a fashion that minimizes its downside, as follows:

The **essential conditions for any carbon pricing system**, whether a carbon tax or cap-and-trade include:

- The system must be effective:

- It must be sufficiently aggressive to allow the province to meet or exceed its emissions targets (i.e., the carbon tax must be sufficiently high or the number of carbon emission permits must be sufficiently low).
- Coverage of sectors and emitters must be as comprehensive as feasible.
- The system must complement other greenhouse gas reduction policies and allow for linkages with other jurisdictions.
- If an emissions trading system is used, permits should be auctioned rather than given away to polluters. Phasing in may be accomplished through a declining number of emission permits.
- Emission permits must not be permanent. They should be renewed regularly (e.g., annually).
- The system must respect for the principles of fairness and environmental justice, including designing a transfer mechanism to compensate those of modest means to ensure they are not made worse off by carbon pricing.
- The system must level the playing field as much as possible. Firms inside and outside the system must be treated the same. Comprehensive coverage would help yield in-province fairness, while border adjustments would improve fairness for Ontario firms when competing with firms from other jurisdictions (e.g., impose taxes on imports equivalent to the carbon prices that Ontario firms face).
- Predictability is important: a tax or cap reductions should be phased in on a publicized schedule.
- Regular reporting on how revenues are spent would help ensure transparency and accountability.
- Results should come quickly and in a visible way.
- Offsets, if used, must be very limited and controlled (see Appendix C).

Actions in Key Sectors

Carbon pricing is necessary to achieve reduction emissions across sectors, but it is not sufficient. Sectors differ in material ways that necessitate targeted strategies to complement the carbon pricing regimen. We consider certain key carbon-emitting sectors next:

1. **Transportation.** Transportation is a major contributor to greenhouse gas emissions in Ontario (34 per cent in 2012, according to the discussion document). A general carbon price on transportation fuels would be an important signal to users to economize on carbon. In the absence of a general carbon tax, it would still make sense to update the gasoline tax:

Ontario has not raised its gasoline tax since January 1992 (14.7 cents per litre for unleaded).⁹ At that time, a litre of regular unleaded gasoline cost 49.8 cents on average in Ontario.¹⁰ As of December 29, 2014, a litre of regular unleaded gasoline averaged 96.7 cents.¹¹ Since the tax rate on volume was frozen, this was equivalent to a cut of 48.5 per cent in the tax rate on value. And that was after the cost of gasoline in Ontario had plummeted from 141.8 cents per litre in June 2014; at that point, the frozen volume tax was equivalent to a 64.8 per cent cut in a tax on value. The gasoline tax as a share of the average total price dropped from 37.9 per cent in 1992 to 15.2 per cent in December 2014. The tax share of the gasoline price was as low as 10.4 per cent in June 2014 when gasoline prices were higher.

As the Drummond report pointed out, the above taxes apply to volumes rather than value. Unless the taxes are continually raised to account for inflation, this amounts to ongoing cuts in the tax rate. Drummond advised replacing such taxes with taxes that apply to value.¹² This would help to build the Ontario government's fiscal capacity.

In addition to pricing, the government must ensure that generated revenue is recycled on a transparent basis into transportation (e.g., transit and active transportation). The government's commitments of \$15 billion over ten years for transit in the Greater Toronto and Hamilton Area (GTHA) and \$14 billion total over ten years for transit and transportation infrastructure across the rest of the province^{13 14 15} are welcome first steps, but more investment is required. For example, the \$15 billion commitment to the GTHA falls short by 25 per cent of transit spending planned under Metrolinx's Big Move.¹⁶ Furthermore, new revenue sources are required to make the commitment credible. The government infrastructure funding announcement merely transferred existing revenue to transit, and promised some proceeds of asset sales and of green bond sales. None of these are sustainable measures. Net revenue from carbon pricing and increased gasoline taxes would be sustainable.

Taking a longer perspective, the government must use resources at its disposal to promote community design that is conducive to transit and active transportation (active transportation includes walking and bicycling). A side benefit will be healthier communities that are more enjoyable to live in and which reduce health costs. Pricing carbon will provide an incentive to improving community design, but government can do its share through better planning of land use and infrastructure, such as changed zoning and building

requirements (e.g., limiting suburban sprawl and requiring builders to deliver mixed income communities), direct investment, etc. Furthermore, government can assist with the development and subsidization of lower carbon transportation technologies.

2. **Buildings and Communities.** A significant portion of Ontario's energy is spent heating and cooling buildings (17 per cent of emissions in 2012 according to the discussion document). The cheapest and cleanest energy is that which isn't used; energy conservation and energy efficiency ought to be primary objectives. Putting aggressive carbon reduction targets in all ministries and all policies would be a start. That would include incorporating the necessary implications into building codes and planning process. For example, before thermally generated power was considered, it should be expected to be combined with local heating, to increase efficiency of energy use. When it comes to green energy, local concerns must be dealt with in a democratic consultative fashion, but unnecessary obstacles must be removed. For example, there is no reason not to lift the current moratorium on off-shore wind turbines.

In addition to government's role governing planning and construction, it could also promote energy conservation through retrofits on its own buildings and through subsidies to retrofits on housing. It could target social housing and substandard housing first. One of the benefits would be additional employment in the construction industry. Government could also promote energy conservation practices through pooling and sharing knowledge about energy conservation.

3. **Electricity.** Ontario's closure of its coal-fired generating plants was a very significant step, but power generation remains a significant source of GHGs (9 per cent in 2012) and pollution. The first step is energy efficiency, which could be addressed at the transportation, housing and industrial levels. The next step is to minimize the carbon footprint per unit of energy produced. The Green Energy and Green Economy Act was potentially a big part of the solution, but it has yet to deliver substantially on its promise.

Recommendations:

- 1. Design and implement a comprehensive program that will meet or exceed Ontario's emission reduction targets of 15 per cent below 1990 levels by 2020 and 80 per cent below by 2050. Integrate a greenhouse gas reduction perspective into policy in all relevant areas, including across all ministries.**
- 2. Implement a well-designed carbon pricing mechanism that is as comprehensive as feasible, and that ramps up in a predictable way to use market forces to guarantee Ontario meets or exceeds its greenhouse gas emission targets.**
 - a. Implement a carbon tax. In the event that the inferior cap-and-trade system is used, ensure that it is comprehensive and that emission permits are auctioned -- not given away.**
 - b. Incorporate the principle of fairness in any carbon pricing mechanism, to ensure that vulnerable populations are not made worse off, and to protect Ontario firms.**
 - c. Use revenues from carbon pricing to fund carbon reduction programs, climate adaptation, and to address fairness issues arising out of implementing carbon pricing.**
 - d. Report regularly on carbon pricing revenues and how they are spent, to strengthen transparency and accountability, and to maintain support for the program.**
- 3. Develop and implement carbon reduction strategies for each major emitting sector. In particular:**
 - a. In the energy sector:**
 - i. Promote energy conservation and energy efficiency.**
 - ii. Promote more green energy.**
 - iii. When energy must be produced, increase reliance on renewable energy such as community-based, appropriately located and scaled water, wind, solar and bioenergy. Ensure new developments are subject to robust environmental assessments, including assurances of appropriate siting, scale and community involvement.**
 - iv. Do not build new nuclear power plants or engage in major nuclear rebuilds, as such enterprises are too costly and too risky.¹⁷**
 - b. Increase commitments to fund transit and active transportation.**
 - c. Promote urban design that facilitates transit and active transportation.**

- d. Update the gasoline tax, which has been frozen since 1992. Heed the the advice outlined in the Drummond report, and tax the value of gasoline, not the volume of gasoline. Phase in increases that all catch up to the 1992 tax rate, expressed as a share of the price of a litre of gasoline.**

Appendix A.

RNAO Response to Climate Change Stakeholder Questions, As They Appear in Ontario's Climate Change Discussion Paper 2015

Traditional Knowledge

What are the best ways to employ the traditional knowledge of First Nations and Métis communities in the process of developing the climate change strategy and action plan, and in implementing their provisions?

RNAO response: All communities should be consulted on climate change strategy and action, but First Nations Inuit and Métis communities are generally more affected by and vulnerable to climate change. They have a deep understanding of the impacts on their lives. Justice and equity demand that strong and concerted efforts be made to ensure those communities are fully consulted on planning and implementation of climate change strategies.

Actions in Key Sectors

What can each of the key sectors, including transportation, industry, buildings, electricity, agriculture, waste and forestry, do to contribute to Ontario's 2020 and 2050 targets?

RNAO response: These sectors are all important contributors to greenhouse gases (GHG), and each one must do its share of reducing Ontario's carbon footprint. A GHG-reduction perspective must be integrated into policy in all these areas. For example, the proposed carbon pricing system should cover each sector to the extent feasible, and revenue should go towards GHG reduction in those areas (e.g., in the transportation sector, revenues could fund transit and active transportation). Because the issues are very different between each sector, each requires its own strategy. For instance, building standards could be revised to require higher energy efficiency (reducing carbon emission due to buildings), while zoning and community design could promote communities that raise the use of active transportation and transit (reducing transportation emissions).

What can government better do to encourage industry to further increase rates of innovation that would lead to improved productivity of all capital, including natural capital, in order to reduce emissions?

RNAO response: Carbon pricing will direct resources to economize on the use of carbon, while revenue from carbon pricing can be spent on promoting carbon reduction in the sector in which it was generated -- which again will make investments in economizing on carbon more remunerative. The government can

play a more aggressive role in subsidizing/investing in and disseminating research that will promote innovation in capital productivity.

What Industry sectors may best be able to achieve voluntary emissions reductions by 2020 and by 2050 sufficient to achieve Ontario's emissions targets?

RNAO response: We need to provide incentives in all sectors in order to reach these essential targets. We cannot reasonably expect significant voluntary reductions without incentives. The failure to price carbon is a de facto subsidy to carbon emissions; government must move quickly to eliminate that subsidy and send the right signal to markets. Firms will then economize on carbon. Failing in one sector will likely cause us to miss our targets. Heating and transportation are two areas, which will require substantial policy change and substantial investments. For example, higher energy efficiency requirements would help drive energy efficiency in buildings, while improved urban planning and community design would reduce transportation emissions by reducing the distance that people have to travel and by making transit and active transportation the preferred transportation options.

What role can the agricultural and forestry sectors play in reducing emissions and/or providing carbon sinks or offsets?

RNAO response: Government should recognize the importance of carbon sequestration in forests, and do what it can to protect and expand greenbelts. However, it should be careful not to let carbon sequestration be a substitute for reducing carbon emissions.

What role should land use planning have in affecting Ontario's boreal carbon storage?

RNAO response: It should restrict urban sprawl and encourage densities that are better served by transit, and which are walkable and bikeable communities. Ontario's green spaces should be protected and expanded.

Climate change will have an impact on Ontario's food supply. What role should this issue play in Ontario's climate strategy?

RNAO response: While government should do everything it can to mitigate climate change, it must assist food producers to adapt to climate change. The impact of climate change on the food supply can also be used as one solid rationale to justify a comprehensive climate change strategy.

How can Ontario best achieve reductions in emissions in the transportation sector sufficient to achieve Ontario's targets?

RNAO response: As above, the externalities of transportation ought to be internalized through carbon pricing, via a carbon tax (preferred) or an inclusive cap-and-trade. That could be augmented by an updating of the gas tax, which has been frozen since 1992. With respect to gas taxes, the Drummond report recommended that taxes on volumes ought to be changed to taxes on values, so that they can keep pace with inflation. The failure to keep pace with inflation amounts to an escalating subsidy to driving. In addition to pricing, the government ought to take the revenue from carbon pricing and apply it to carbon reductions in the sector. In the case of urban centres, that should include investment in transit infrastructures and services, and expansion of active transportation infrastructure.

What are the barriers to uptake in low-emission, zero-emission, and electric vehicle use in Ontario?

RNAO response: The failure to price carbon puts these vehicles on an uneven playing field. Full-cost pricing of carbon would level the playing field, and in the phase in, government could accelerate the leveling effect through subsidies to manufacturers and possibly on the purchase price of greener vehicles. The government should also ensure that there is sufficient infrastructure to support the use of electric cars (including accessible charging stations).

Communities & Built Form

Transportation emissions have grown at a rate faster than any other class of emissions largely because of population growth and urban expansion. What role could the Growth Plan for the Greater Golden Horseshoe and other planning mechanisms play, in combination with other government initiatives such as electrified Regional Express Rail, in stabilizing the growth in transportation and building emissions?

RNAO response: Limiting urban sprawl and zoning for appropriate densities would allow transit to compete with the private automobile. Effective carbon pricing would act as a further signal to direct land use in a more sensible and sustainable way. Electrified rail transit would help to reduce emissions.

Building net zero communities and buildings are already possible from an engineering standpoint yet few have been constructed. In Ontario, what changes are needed to building codes and planning processes to ensure greater uptake with regard to geothermal, solar, wind, natural light, combined heat and power, community energy and other emerging technologies?

RNAO response: Putting aggressive carbon reduction targets in all ministries and all policies would be a start. That would include incorporating the necessary implications into building codes and planning processes. For example, there could be a requirement to mandate use of combined heat and power whenever

thermal power generation is proposed. When it comes to green energy, local concerns must be dealt with in a democratic consultative fashion, but unnecessary obstacles must be removed. For example, the current moratorium on off-shore wind turbines should be lifted. As with the above discussion on transportation, carbon pricing would provide further incentive for green alternatives. Revenue generated from taxing energy generation could be directed into greener energy.

Buildings must be operated as efficiently as possible – if not operated properly “green” buildings cannot achieve their sustainability objectives. Does Ontario have the skill base to build and operate such buildings and communities and, if not, what more can be done to train the appropriate expertise?

RNAO response: If any upgrading is necessary of building management skills to achieve sustainability, government should design programs or modify existing training programs to ensure sufficient skills exist across the province. This would include continuing education to adapt to changing standards and to adopt most appropriate technologies as they evolve.

When including emissions from electrical demand and heating gas, buildings in Ontario already account for about 1/4 of our emissions. How could emissions from the existing building stock be reduced sufficiently to ensure Ontario achieves its future targets?

RNAO response: Much of Ontario’s housing needs energy-saving retrofits. It would be a big undertaking, and a big source of employment. This ought to be a growth industry. Some of this could be achieved through government expenditure on its own buildings and through tax breaks and subsidies for retrofits. It makes sense to go after social housing and substandard housing first.

What more could be done to ensure more Ontarians have the capacity to invest in low-carbon buildings and technologies?

RNAO response: A number of measures could be taken. Low interest loans could be offered for specified types of retrofits. Government could pool and share knowledge on optimal investments in retrofits. Health considerations are key: retrofits properly done with enhanced air exchange would provide health benefits from improved indoor air quality, but we must be careful about simply sealing up buildings, which could make indoor air quality worse. Knowledge shared and building standards should incorporate health considerations.

Risk assessment will be critical in the design and rehabilitation of infrastructure. How can Ontario communities best determine their local vulnerabilities and risks, engaging local leaders in government, First Nations and Métis communities, and the private sector?

RNAO response: Communities must be supported to build climate resilience, including developing and protecting physical, social and environmental infrastructure. That must be done with in full consultation with those communities. As the discussion document says, an adaptation lens must be applied to all funding and infrastructure processes.

Price on Carbon

This spring Ontario will confirm the market mechanism or mechanisms that will be used to price Carbon in Ontario. Some of the goals of carbon pricing include:

- *ensuring greenhouse gas emissions reduction certainty;*
- *supporting and encouraging innovation in industry;*
- *improving human, social, financial, produced and natural capital productivity; and*
- *supporting households and business transition to the low carbon economy.*

Given the above, what market mechanism or mechanisms will best achieve these goals for Ontario?

RNAO response: Virtually all experts agree that a carbon tax is superior to cap-and-trade, in terms of comprehensiveness, efficiency, simplicity, ease and speed of implementation, and resistance to corruption and gaming. Furthermore, cap-and-trade would be very inequitable if it awarded pollution rights commensurate with past pollution behaviour. Also, it wouldn't generate enough revenue if most of the emission rights were simply given away. The government is aware of all this, and unfortunately is indicating that it will go with cap-and-trade. We recommend a carbon tax, which could be labelled a carbon fee to deal with political sensitivities. The main point we would want to make is, that in the event of a cap-and-trade, we should minimize its weaknesses by taking the following measures:

- ensure that the program covers as much of the GHG emissions as possible (covering all key sectors and covering most or all emitters in each sector).
- ensure that the cap is sufficiently stringent that we can meet Ontario's greenhouse gas targets of 15 per cent below 1990 levels by 2020 and 80 per cent below by 2050.
- keep reducing the cap every year to keep emission reductions on target.
- auction emission permits, rather than giving them away. Giving them away forgoes a ton of revenue and invites corruption and gaming.

- The system must respect the principles of fairness and environmental justice, including designing a transfer mechanism to compensate those of modest means to ensure they are not made worse off by carbon pricing.
- The system must level the playing field as much as possible. Firms inside and outside the system must be treated the same. Comprehensive coverage would help yield in-province fairness, while border adjustments would improve fairness for Ontario firms when competing with firms from other jurisdictions (e.g., impose taxes on imports equivalent to the carbon prices that Ontario firms face).
- Predictability is important: a tax or cap reductions should be phased in on a publicized schedule.
- Regular reporting on how revenues are spent would help ensure transparency and accountability.
- Results should come quickly and in a visible way.

While carbon pricing is necessary, it is not sufficient, as complementary strategies must address emissions in each sector.

For those industries already facing challenges today due to changing economic conditions or technological advances in other jurisdictions, what carbon pricing market mechanism or mechanisms would be most beneficial? What design considerations should be taken into account?

RNAO response: We would not change the above criteria for carbon pricing, which incorporate the principle of equity. If we are concerned about competition from non-carbon-priced jurisdictions, then border adjustments could be implemented (i.e., taxes on imports equivalent to the carbon price and equivalent subsidies on exports to those same jurisdictions). The drop of the dollar to its fair, purchasing power parity (PPP) value has leveled the playing field for Ontario producers competing with foreign producers, so the timing of a carbon pricing initiative is very good. The drop in the price of oil means that a tax on hydrocarbons is very timely; consumers will notice it much less.

Science & Technology

In what areas of low-carbon science and technology does Ontario have competitive advantages or strategic interests?

RNAO response: Ontario's Green Energy and Green Economy Act already provides some support for renewable energy through the feed-in tariff program, and that has encouraged some expertise in wind and solar energy. Due to slack in the manufacturing sector, there is an available skilled workforce that could be

used to produce green energy products. The decline of the Canadian dollar to a fair and realistic value levels the playing field between Ontario firms and foreign competitors. With a growing global demand for sustainable energy, forces are all working in the right direction.

How can Ontario better support early stage research that could lead to the future commercialization of technologies that will provide economic benefits while also helping Ontario achieve its carbon reduction goals?

RNAO response: Overcoming unreasonable obstacles to green energy (such as the moratorium on off-shore wind energy) would allow the industry to expand and take technology to the next level. There may be room to support research into wind, solar, thermal, hydro and tidal energy, in the public and private sectors.

Appendix B.

Key Conclusions of Intergovernmental Panel on Climate Change

The IPCC Fifth Assessment Synthesis Report (*Climate Change 2014 Synthesis Report*) concludes:

Observed Changes and their Causes

Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems.¹⁸

Observed changes in the climate system

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen.¹⁹

Causes of climate change

Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the climate system and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century.²⁰

Impacts of climate change

In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans. Impacts are due to observed climate change, irrespective of its cause, indicating the sensitivity of natural and human systems to changing climate.²¹

Extreme events

Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea

levels and an increase in the number of heavy precipitation events in a number of regions.²²

Future Climate Changes, Risks and Impacts

Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks.²³

Key drivers of future climate

Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond. Projections of greenhouse gas emissions vary over a wide range, depending on both socioeconomic development and climate policy.²⁴

Appendix C.

Offsets, if used, must be tightly controlled

In lieu of permits, some trading systems would allow offsets for activities that reduce atmospheric greenhouse gases in the local jurisdiction or elsewhere. This is a way of getting around the existing cap, and we would advise against their use. If used, offsets must be strictly limited in order to allow Ontario to reach its reduction targets. We echo the advice of the Canadian Environmental Law Association in its July 27, 2009 submissions to the Environmental Registry concerning greenhouse gas emissions:²⁵

If used, such offsets must only be recognized if:

- real reductions in emissions occur, above what would have happened anyway;
- they are surplus to the provider's own permits;
- reductions are verifiable;
- trades are enforceable; and
- resulting reductions are permanent (e.g., an offset for planting trees would be meaningless if that space were later paved over.)

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¹² Commission on the Reform of Ontario's Public Services. (2012). *Public Services for Ontarians: A Path to Sustainability and Excellence*. P. 426. Retrieved January 22 at <http://www.fin.gov.on.ca/en/reformcommission/chapters/report.pdf>.

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¹⁴ Ontario Liberal Party. (2014). *Questionnaire Response: Ontario Public Transit Association*. Retrieved March 16, 2015 at <http://www.octa.on.ca/downloads/elections/OPTA-Liberal-Response-2014.pdf>.

¹⁵ Ontario Liberal Party. (2014). *Questionnaire Response: Registered Nurses' Association of Ontario (RNAO)*. Retrieved March 16, 2015 at http://rnao.ca/sites/rnao-ca/files/Liberal_Response_RNAO.pdf.

¹⁶ The \$15 billion commitment over ten years averages out to \$1.5 billion per year, whereas the Big Move was costed at \$2 billion per year. See Metrolinx. (2008). *The Big Move*. p. 68. Retrieved March 16, 2015 at http://www.metrolinx.com/thebigmove/Docs/big_move/TheBigMove_020109.pdf.

¹⁷ RNAO. (2012). *Position Statement: Healthy Energy Solutions for Ontario*. Pp. 5,6. Retrieved March 24, 2015 at http://rnao.ca/sites/rnao-ca/files/RNAO_Position_Statement_on_Healthy_Energy_Solutions_-_FINAL_and_dated_March_3_2011.pdf.

¹⁸ Intergovernmental Panel on Climate Change. (2014). *Climate Change 2014: Synthesis Report*. P. 1. Retrieved March 6, 2015 at http://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_LONGERREPORT_Corr2.pdf.

¹⁹ Op. cit. p. 1.

²⁰ Op. cit. p. 4.

²¹ Op. cit. p. 6.

²² Op. cit. p. 7.

²³ Op. cit. p. 8.

²⁴ Op. cit. p. 8.

²⁵ Canadian Environmental Law Association. (2009). *Re: Discussion Paper: A Greenhouse Gas Cap-and-Trade System Ontario – EBR Registry No. 010-6740; Environmental Protection Amendment Act, (Greenhouse Gas Emissions Trading) 2009 – EBR Registry No. 010-6467*.