MEASURING SUSTAINABLE DEVELOPMENT

APPLICATION OF THE GENUINE PROGRESS INDEX TO NOVA SCOTIA

THE AMBIENT AIR QUALITY ACCOUNTS *for the* NOVA SCOTIA GENUINE PROGRESS INDEX

EXECUTIVE SUMMARY

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This report examines Nova Scotia's ambient air concentrations and emissions of five key air pollutants (referred to as "criteria air contaminants"):

- Carbon Monoxide (CO)
- Total Particulate Matter (TPM or PM)
- Sulphur Dioxide (SO_2)
- Nitrogen Oxides (NOx), including nitrogen dioxide (NO_2)
- Volatile Organic Compounds (VOCs)

Estimates of the costs of damages caused by emissions of these pollutants are also examined.

Exposure to these pollutants can result in negative impacts on human health, leading to increased doctor's office visits, hospital emergency room visits, hospital admissions, days on which existing respiratory illnesses are worsened, and restricted activity days, as well as premature mortality. Air pollution can also cause damages to materials and agriculture crops (leading to reduced yields), and changes in forest productivity.

Ambient Concentrations of Air Pollutants in Nova Scotia and Canada

Between 1979 and 1996, national ambient concentrations of CO, PM, nitrogen dioxide (NO_2), and SO_2 decreased significantly:

- CO annual average concentrations decreased by 63%
- PM annual average concentrations decreased by 40%
- SO_2 annual average concentrations decreased by 50%
- NO_2 annual average concentrations decreased by 31%

Unlike the national trends for CO, total PM, SO_2, and NO_2, which show dramatic declines since 1979, the national annual average concentrations of ground-level ozone *increased* by 34% between 1979 and 1996.

In Nova Scotia, with some exceptions, concentrations of CO, PM, and SO_2 have shown dramatic declines since the 1970s, similar to the declines seen in the national trends. However, the trends for NO_2 and ground-level ozone at some sites in Nova Scotia do not show similar significant declines.

Carbon monoxide concentrations in downtown Halifax decreased by 63% between 1977 and 2001. Between 1974 and 2001, PM concentrations in Nova Scotia decreased by between 53% (TUNS, Halifax monitoring site) and 79% (Whitney Pier Fire Station, Sydney). The dramatic decline in PM levels in Whitney Pier is largely due to the closure of the Sydney Steel coke ovens in 1988. In general, PM levels detected at Sydney-Glace Bay monitoring stations are still about twice the levels detected at Halifax-Dartmouth sites.

Ambient concentrations of SO_2 measured in Nova Scotia have decreased significantly since the 1970s. Point Tupper is the only monitoring site in Nova Scotia where annual mean exposure to

SO_2 continued to exceed the annual National Ambient Air Quality Objective maximum acceptable concentration (MAC) in the most recent years for which data are available (1994 and 1995). Point Tupper is therefore the only monitored area where Nova Scotians in those years continued to be exposed to SO_2 at a level known to affect people with respiratory problems and to increase death rates among the elderly. Exceeding the annual MAC for SO_2 has demonstrable health impacts, yet monitoring at Point Tupper ceased in 1995 and no data are available from this site for the last eight years.

Between 1976 and 2001, NO_2 concentrations in Halifax decreased by 20%. NO_2 annual mean concentrations at the Shearwater monitoring station in Dartmouth were considerably lower than those at the Downtown Halifax monitoring site. However, between 1976 and 1993, NO_2 concentrations at Shearwater increased by 14%. In Cape Breton, NO_2 concentrations at the Point Aconi Lighthouse also increased by 14% (1996-2002) and concentrations at the Millville sampling site increased by 100% (1996-2002). However, the concentrations recorded are still well below the annual maximum desirable concentration (MDC) and the annual MAC.

Ground-level ozone concentrations decreased by 43%-49% (Downtown Halifax, 1977-2001, and CFB Shearwater, Dartmouth, 1976-1998). However, at both sites, ground-level ozone levels have not improved since the late 1980s and are still higher than the annual MAC.

Ground-level ozone concentrations at Kejimkujik National Park increased by 8% between 1986 and 1988 and by 21% between 1992 and 2001. Concentrations at Dayton (Yarmouth) decreased by 13% over the six-year period from 1994 to 2000. But ozone levels at both sites are consistently about twice the MAC. These are important monitoring sites, since there are no significant local sources of ground-level ozone precursors, and they therefore indicate the extent of transboundary flows of pollutants.

Continuing high ground-level ozone concentrations above the MAC at all Nova Scotia monitoring stations are a cause for concern because ozone has been linked with a broad spectrum of human health effects, including nausea; eye irritation; headache; increased respiratory illness such as bronchitis, asthma, pneumonia, and emphysema; decreased lung function, including decreased exercise capacity, premature aging of the lungs, and possible long-term development of chronic lung disease; reduction of the body’s defences against infection; and exacerbation of cardiovascular disease and of respiratory disease such as asthma. Because of its reactivity, ozone can also injure biological tissues and cells. When inhaled, ozone can inflame and damage the lining of the lung, causing symptoms such as wheezing, coughing, shortness of breath, throat irritation, and pain on deep inspiration. Ground-level ozone exposure is associated with increased hospital admissions, emergency room visits, and premature mortality due to cardiovascular and respiratory illness.

Compared to other monitoring sites located in commercial areas in various Canadian cities, the average Downtown Halifax CO concentration in 2001 was lower than concentrations detected at Montreal, Toronto, Hamilton, Winnipeg, and Vancouver monitoring sites and higher than concentratins detected at sites in St. John’s, Ottawa, Saskatoon, Victoria, and Kelowna. At 0.6ppm, the average 2001 Downtown Halifax concentration was the same as concentrations detected at Saint John, Edmonton, Calgary, and Regina sampling sites.

In 1998, the annual average PM concentration detected at TUNS in Halifax was half the PM concentrations measured at sites in Hamilton, Calgary, and Edmonton. The PM concentration at the County Jail site in Sydney in 1998 was higher than the TUNS concentration, but lower than the concentrations detected at Montreal, Ottawa, Hamilton, Winnipeg, Edmonton, and Calgary monitoring sites.

In 2001, the Downtown Halifax site had the highest SO_2 concentration of any commercial site in Canada – between 2 and 12 times the SO_2 concentrations detected at other Canadian sites in commercial areas. The Downtown Halifax site was the only commercial site in Canada to exceed the annual MDC of 11ppb in 2001.

In 2001, the highest NO_2 concentrations in Canada were at Montreal, Toronto, Edmonton, Calgary, and Vancouver monitoring sites. The Downtown Halifax concentration was lower than the concentrations at these sites, but higher than concentrations at St. John's, Saint John, Winnipeg, Regina, and Victoria sampling sites.

The highest ground-level ozone concentrations in Canada occurred at Aylesford Mountain in King's County (NS), Steeper (AB), Kejimkujik National Park (NS), and Tiverton (ON) sampling sites. These concentrations were 2.3-2.7 times the annual MAC. At the Downtown Halifax site, the annual average ground-level ozone concentration in 2001 exceeded the annual MAC and was comparable to concentrations detected at sites in cities like Toronto and Hamilton. The 2001 Downtown Halifax concentration was two to three times the concentrations at Montreal and Vancouver sampling sites located in commercial areas.

In sum, while there have been significant improvements in the quality of both Nova Scotia's and Canada's ambient air since the 1970s, there are still some areas of concern, particularly with respect to ground-level ozone concentrations.

Emissions of Criteria Air Contaminants in Nova Scotia and Canada

Among the ten provinces, Alberta and Saskatchewan were the two largest per capita emitters of air pollutants in Canada in 1995. Nova Scotia was close to the Canadian average on most pollutants but twice the Canadian average in per capita SOx emissions and 24% higher than the Canadian average in per capita TPM emissions. Among the ten provinces, Nova Scotia had the seventh highest per capita emissions of CO, the fourth highest per capita emissions of NOx, the third highest per capita emissions of SOx, and the fifth highest per capita emissions of TPM and VOCs in 1995. On a per capita basis, Ontario and Quebec generally had the lowest per capita pollutant emissions in the country.

Despite having a relatively small population, Nova Scotia emits more SOx from electric power generation by utilities than any other Canadian province (135kt). Nova Scotia alone accounts for 25% of Canada's SOx emissions attributable to electric power generation (534kt). On a per capita basis, Nova Scotia electric power generation emissions of SOx are 145kg/capita, more than 8 times the Canadian average.

According to the most recently available comparative international statistics, Canada had the highest per capita emissions of CO, PM, SOx, and VOCs out of all countries reporting emissions to the OECD, and the third highest per capita NOx emissions. On a per capita basis, Canada is therefore the worst air pollutant emitter in the OECD.

Like Canada, Nova Scotia also had higher per capita emissions of CO, PM, SOx, and VOCs than all reporting OECD countries and higher per capita NOx emissions than all countries except Iceland and the USA. Nova Scotia's per capita SOx emissions (180kg/capita) were twice as high as Canada's (90kg/capita) and 2.6 times as high as the next highest OECD country – the U.S. (69kg/capita). Like Canada, Nova Scotia is therefore a worse air polluter, on a per capita basis, than any OECD country.

Damage Costs of Nova Scotia's Criteria Air Contaminant Emissions

The damage costs of Nova Scotia's criteria air contaminant emissions presented in this report reflect the human health impacts of air pollution, including premature mortality, as well as decreased visibility, materials damage, and reduced agricultural yields and forest productivity attributable to air pollution. As well, air pollution causes damages to lakes and rivers, and acid deposition has been linked to declining salmon, trout and other fish populations. The range of cost estimates provided here is based on conservative to higher-end estimates in the literature.

Air pollutants can be carried thousands of miles from one area to another and across borders. This phenomenon is referred to "long-range transport of air pollutants" or "transboundary pollution." Air pollutants from central Canada and the U.S. are transported by prevailing summer winds to Atlantic Canada (particularly New Brunswick, Nova Scotia, and Prince Edward Island). Thus, the quality of ambient air within Nova Scotia and the impacts of air pollutants on Nova Scotia can be attributed to both emissions sources within the province and emissions sources outside the province. While some of Nova Scotia's air pollution problems are imported, it is also likely that some portion of Nova Scotia's own air pollutant emissions are exported.

The damage costs of Nova Scotia's CAC emissions are not specific costs borne by the province itself. The economic valuation method used in this study demonstrates the full costs of the activities of Nova Scotians, even if these costs are borne by other jurisdictions. It places full responsibility for pollution generated within the province on the province itself, focuses attention on actions over which Nova Scotians have control, and provides an implicit motivation to reduce emissions and become a model for other jurisdictions. The emissions-based approach used in this study indicates that the true cost of Nova Scotian air emissions necessarily includes the impact of pollutants transported outside the province.

The cost of Nova Scotia's emissions of CO, PM, SOx, NOx, and VOC emissions is high. Based on 2002 emissions alone, the damage costs of Nova Scotia's emissions of five criteria air contaminants (CO, total PM, SO_2, NO_2, and VOCs) are estimated to be between $529 million and $3.2 billion ($C2000), or $560 to $3,440 per Nova Scotian.

Over the last ten years (1990-1999), Nova Scotia's CAC emissions resulted in an estimated $5.7 billion to $35 billion in cumulative damage costs, of which SOx contributed an estimated $2.3–

$17.8 billion in damages. On a per capita basis, each Nova Scotian is responsible for a total of $6,181 to $37,790 in air pollutant damages over the past ten years.
Between 2000 and 2009, based on projected emissions estimates, Nova Scotia's CAC emissions are projected to produce cumulative damage costs between $5.2 billion and $31.5 billion, or between $5,590 and $33,973 for each individual living in Nova Scotia. Sulphur oxides (SOx) will again be the largest contributor to these damages, producing a projected $2–$15.6 billion in damage costs due to SOx emissions over these ten years, again accounting for between 40-50% of total costs.

These cost estimates are based on a "business as usual" scenario (assuming no future emissions reductions of criteria air contaminants), and reflect the costs associated with human health effects and other effects such as reduced visibility, materials damage, and agricultural damage attributable to air pollution.

The most costly provincial source of air pollution damage is non-industrial fuel combustion – primarily for electric power generation. In 2002 alone, damage costs of $306 million to $2 billion can be attributed to CAC emissions from non-industrial fuel combustion, $90 million to $592 million can be attributed to transportation CAC emissions, and $108 million to $518 million can be attributed to industrial CAC emissions ($C2000). Seven specific source sectors within these three categories (electric power generation, residential fuel wood combustion, light-duty gasoline vehicles, heavy-duty diesel vehicles, pulp and paper industry, light-duty gasoline trucks, and marine transportation) contributed $356 million to $2.4 billion ($C2000), or 67-76%, of the total damage costs associated with Nova Scotia CAC emission in 2002.

Non-industrial fuel combustion accounted for between 58% and 62% of total damages attributable to all CAC emissions in Nova Scotia in 2002. Between 1970 and 2009, non-industrial fuel combustion emissions account for an estimated $13.8–$88.8 billion in cumulative damage costs.

The most significant sources of fuel combustion emissions are electric power generation and residential fuel wood combustion. Electric power generation alone accounted for between $208 million and $1.6 billion in damages attributable to 2002 pollutant emissions – equal to between 39% and 50% of all air pollution damage costs caused by Nova Scotian pollutant emissions from all sources. This is due primarily to the continued reliance on coal as the major fuel source for electric power generation in Nova Scotia. Residential fuel wood combustion accounted for between $56 million and $257 million of the total damage costs attributable to Nova Scotia's CAC emissions in 2002. This is between 8% and 11% of all damage costs caused by Nova Scotia's total CAC emissions.

Industrial and transportation sources are the second largest contributors to air pollution damages resulting from Nova Scotia air pollutant emissions. Industrial sources accounted for 16-20% of total damages attributable to all CAC emissions in Nova Scotia in 2002, and are estimated to account for a cumulative total of $5.1–$23.7 billion in damages between 1970 and 2009.

The most significant industrial sources of air pollutant emissions in Nova Scotia are the pulp and paper industry, mining and rock quarrying, and the upstream oil and gas industry. Nova Scotia's pulp and paper industry alone contributed between $18 million and $106 million in air pollution damage costs attributable to 2002 emissions. This amounts to more than 3% of all air pollution damage costs caused by Nova Scotian pollutant emissions from all sources.

Transportation sources accounted for 17-19% of total damages attributable to all CAC emissions in Nova Scotia in 2002, and are estimated to account for a cumulative total of $4-$26 billion in damage costs from 1970-2009. Light-duty gasoline trucks and vehicles were the largest contributors to transportation sector emissions of CO, NOx and VOCs in 2002. Light-duty gasoline vehicles and trucks contributed between $43 million and $254 million in air pollution damage costs attributable to 2002 emissions, accounting for 8% of damages attributable to air pollutant emissions from all sources in the province. Heavy-duty diesel vehicles and off-road use of diesel were the largest contributors to TPM transportation emissions. The largest emitters of SOx in the transportation sector were marine transport and heavy-duty diesel vehicles.

These damage cost estimates point to important policy directions, because they indicate the sectors where emission reduction initiatives may produce the largest benefits.

Individual Actions to Reduce Air Pollutant Emissions

In addition to needed government and industry actions to reduce air pollutant emissions, some simple consumer choices can help reduce CAC emissions from non-industrial fuel combustion and transportation sources. Household energy conservation is one of the simplest ways in which ordinary citizens can reduce their contribution to air pollutant emissions *and* save money for themselves at the same time. A few intelligent energy choices, like turning down the thermostat at night, using energy-efficient light bulbs and appliances, reducing air conditioner use, and running dishwashers and washing machines only when full, can substantially reduce household energy consumption and therefore air pollution.

Transportation emissions can be reduced by car-pooling, taking the bus, or cycling. Households can also consider a more fuel-efficient car when purchasing a new vehicle and can avoid its use as far as possible during poor air quality days. Changes to driving style and driver education can also significantly reduce transportation-related pollutant emissions, and also bring overall fuel economy savings to households.

Consumer selection of new vehicles is a concern, as Canadians are generally switching from small cars to larger vehicles, including light trucks, minivans and SUVs. These trends can stall air quality improvements attributable to per vehicle emissions, since one SUV has an impact on the environment and on air quality that is about three times that of a small car. Similarly, continued suburban and ex-urban sprawl that requires longer commutes threatens to undermine the gains achieved by improved emissions controls. Telecommuting and choosing to live close to one's place of work, combined with integrated transportation-land use planning, can substantially reduce household contributions to air pollution.

SUMMARY OF DATA AND ANALYSIS GAPS

The following data and analysis gaps were identified, and their addition is recommended for future updates of this report:

- ***Other Air Pollutants***. The damage costs estimated in this report include only a small sub-set of possible contaminants in the air. A more comprehensive evaluation of the damage costs of air pollution would include those damages associated with organic and inorganic air contaminants such as hydrogen sulphide, total reduced sulphates, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, dioxins and furans, lead, manganese, and mercury.

- ***Calculating the Damage Costs of Air Pollution Within Nova Scotia.*** The damage cost estimates in this report are based on the impacts of pollutant emissions from Nova Scotia sources, regardless of where those impacts occur. They therefore reflect the conditions over which Nova Scotians have control, but not the costs incurred by Nova Scotians themselves (which include the effects of transboundary pollution from emissions sources outside the province).

  An estimation of the damage costs of ambient concentrations of air contaminants *within* Nova Scotia, regardless of emissions sources, is therefore an important complement to the analysis presented in this report. This will soon be possible through application of new software applications like the Air Quality Valuation Model (AQVM) and Illness Cost of Air Pollution (ICAP) model to Nova Scotia. This will also provide a more detailed break down of costs associated with the health and non-health outcomes of air pollution than the more generalized estimates based on the overall damage costs of emissions in this study.

- ***Evaluation of Control Cost Scenarios.*** A necessary next step from the perspective of full-cost accounting is to evaluate possible scenarios for reducing Nova Scotia's CAC emissions, by comparing the avoided damage costs to the invested control costs. Further research is needed to add the control cost perspective to these *Air Quality Accounts*. This will require a literature review of the range of values for control costs per tonne of pollutant emitted, in order to select estimates appropriate to Nova Scotian conditions and circumstances. This will then allow a comparison of control costs with damage costs, so that these ratios can be used to determine the cost-effectiveness of air pollution protection expenditures and of various emission reduction scenarios. In particular, this analysis should include an evaluation of scenarios affecting those source sectors that contribute most significantly to damage costs (non-industrial fuel combustion – especially electricity generation, transportation sources, and industrial sources – especially pulp and paper).

- ***Stratospheric Ozone Depletion.*** The analysis of air pollution in this study is restricted to contaminants in the troposhpere, the layer of the atmosphere closest to the Earth. However, future updates of this study could broaden the scope of the inquiry to include the impacts of air pollution on other parts of the atmosphere. Thus, stratospheric ozone depletion is clearly an air pollution problem, and should be examined in future updates of these GPI *Air Quality*

Accounts. This analysis should include both an evaluation of the damage costs of stratospheric ozone depletion and of the significant progress in controlling the release of ozone depleting substances since the 1987 Montreal Protocol.

- ***Indoor Air Quality.*** These GPI *Air Quality Accounts* examine only outdoor air. On average, however, Canadians spend about 90% of their time indoors each day, so time spent indoors is an important pathway of exposure to air contaminants. The quality of ambient (outdoor) air is an important issue in affecting indoor air quality, since the quality of indoor air is influenced *both* by the quality of outdoor air *and* by the specific characteristics of indoor sources of pollutant emissions. In almost all inhabited enclosed spaces, there is a continuous exchange of air with the outside. Therefore, all contaminants present in outdoor air are also likely to be present indoors, including CO, PM, NOx, SOx, ozone and other photochemical oxidants, and lead.

  In addition to contaminants originating from outdoors, however, there are also indoor air pollutants, which are not examined in the GPI *Air Quality Accounts.* Biological agents (bacteria, mould, dust mites and their by-products), consumer products (solvents, cleansers, aerosol propellants, and pest control products), asbestos, tobacco smoke, formaldehyde, and radon are all potential contaminants of indoor air.

  There is also concern that the indoor use of natural gas and its additives may be harmful to health, particularly for those with allergies and chemical sensitivities, and that it increases the risk of asthma attacks, reduced lung function, and increased airway obstruction. One U.S. study cites natural gas as the most important source of indoor air pollution, surpassing even passive tobacco smoke. In light of Nova Scotia's growing reliance on natural gas, these issues clearly merit further exploration in the framework of the Nova Scotia GPI.

- ***Data Availability.*** The fact that we have less ambient pollutant concentration data available today than we used to have in the 1980s and early 1990s compromises our ability to assess air quality trends effectively. An exception to this is in Sydney, where ambient air quality data are now collected more consistently, frequently, and in greater detail than previously by the Muggah Creek Remediation Project (see Appendix D). These data are crucial for assessing genuine progress in ambient air quality. From the perspective of the Genuine Progress Index, *more* monitoring data rather than less are essential, and the decline in data availability, monitoring, and reporting on provincial air quality is a major concern. Provincial and federal commitments to upgrade the NAPS Network will be needed to ensure that more comprehensive data are available in the future.

  The frequency of public reporting on air quality at the provincial level has declined sharply – with no province-wide report on air quality released in more than five years. The province has suspended state of the environment reporting. In light of growing traffic congestion in Halifax, it is more important than ever to assess and report the impact of recent trends on air quality.

In addition, there are gaps within the existing data sets that make it difficult to assess trends and genuine progress in ambient air quality. For example, at important monitoring stations like Aylesford Mountain in Kings County and Dayton in Yarmouth, which have reported ozone levels at two or more times the maximum acceptable concentration, and which indicate the extent of transboundary pollution, there are insufficient or no data available for many years, and inadequate data points are available to assess trends over time. At Point Tupper, where SO_2 levels exceeded the annual maximum acceptable concentration (MAC) in 1994 and 1995, monitoring ceased in 1995 and no data are available for the last eight years.

Like ambient pollutant concentration data, air pollutant emissions data are also crucial for assessing genuine progress in ambient air quality. Emissions inventories, forecasts, and projections need to be more comprehensive and more regularly reported than they currently are, in order to assess trends, identify problems, and estimate the damage and control costs associated with emissions. Yet *Emissions Inventory of Common Air Contaminants* reports have not been issued since 1995, and the *Common Air Contaminants Baseline Forecast* includes no projections of CO and PM emissions, or from specific source categories. Such important data need to be provided to assess genuine progress in air quality.

In sum, both air pollutant emissions data and ambient concentration data need to be regularly reported, consistent in methodologies between reporting periods, and accessible to the public in a useful form. What we count, measure and report not only signifies what we value, but also literally determines what gets attention in the policy arena. Better reporting and improved data availability will elevate the priority assigned to air quality issues on the policy agenda, ensure that the health and other consequences of air pollution get the attention they deserve, and stimulate actions to improve air quality further.

Backgrounder: Air Quality and the Genuine Progress Index

We currently measure our progress and gauge our wellbeing according to a narrow set of indicators – our economic growth rates. "The more the economy grows, the better off we are" – or so the theory goes. Yet vital social and environmental factors remain invisible in these measures.

The more trees we cut down, the more fish we catch, and the more fossil fuels we burn, the faster the economy grows. Counting the depletion of our natural wealth as gain is simply bad accounting, like a factory owner who sells off machinery and counts it as profit.

Our growth rates make no distinction between economic activity that creates benefit and that which causes harm. So long as money is being spent, the economy will grow. Crime, pollution, accidents, sickness, and natural disasters like Hurricane Juan all expand the economy.

Fortunately, there are better ways to measure wellbeing and progress. Nova Scotia's new Genuine Progress Index (GPI) assigns explicit values to environmental quality, population health, livelihood security, equity, free time, and educational attainment. It values unpaid voluntary and household work as well as paid work. It counts sickness, crime and pollution as costs not gains to the economy. The GPI can provide a more complete and accurate picture of how Canadians are really doing.

Any index is ultimately normative, since it measures progress towards defined social goals, and all asset values can therefore be seen as measurable or quantifiable proxies for underlying non-market social values such as security, health, equity, and environmental quality. The Nova Scotia GPI consists of 22 social, economic and environmental components, including ambient air quality, the subject of this report.

In the case of this particular component of the GPI, the normative values or goals that serve as the standards for measuring genuine progress are the improvement of ambient air quality[1] and the prevention of potential damage from air pollution[2] that can adversely affect the lives of current and future generations.

A reduction in air pollutant emissions and an improvement in ambient air quality are therefore the primary indicators of success in moving towards those goals and in protecting a vital ecological and social asset – an atmosphere conducive to human life on earth. Conversely, higher rates of air pollutant emissions or declining ambient air quality signify a depreciation of that natural capital asset and an erosion of its value.

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[1] "Ambient" air is the air occurring at a particular time and place outside of structures – in other words, any unconfined portion of the atmosphere.

[2] Air pollution is the degradation of air quality resulting from chemicals or other materials occurring in the air that may result in adverse effects to humans, animals, vegetation, or materials.

The atmosphere supports the lives and activities of humans as well as millions of species of plants and animals. Without clean air, good health and a sound environment for the lasting use and enjoyment of current and future generations will be compromised. Apart from damage to human health, the environment, and materials caused by pollution, the less tangible economic costs related to lost productivity, diminishing availability of natural resources, and social disruption must also be taken into account to determine the overall effect of air pollution. For example, aggravation of asthma symptoms caused by exposure to air pollutants can result in lowered productivity, time lost from work, increased social and monetary costs in caring for those affected, and a diminution in individual quality of life.

Air quality is clearly a major concern to Canadians. More Canadians die and are admitted to hospital for heart and lung problems on days with elevated levels of air pollution than on days when the air quality is better. Air pollution causes millions of dollars in damages to agricultural crops, forests, and materials each year, and acid deposition damages lakes and rivers and kills fish. Because good air quality is an essential prerequisite of health, wellbeing and quality of life, it is one of the 22 core components of the Nova Scotia Genuine Progress Index. Improvements in air quality are key indicators of genuine progress, and the damages caused by air pollution are counted as costs to the economy.