# U.S.-Canada Air Quality Agreement (AQA)

## Bilateral Cooperation for Cleaner Air

April 16, 2024

# History of the Canada-U.S. Air Quality Agreement

- 1970s: concerns over transboundary air pollution began to mount
  - Acid rain was damaging aquatic and terrestrial ecosystems in the eastern U.S. and eastern Canada

- 1980s: bilateral and multilateral engagement initiated
  - 1980: Memorandum of Intent on transboundary pollution
  - 1981: Canada and the U.S. ratified the Convention on Long-range Transboundary Air Pollution
  - 1985: “Shamrock Summit” between U.S. President Reagan/Canadian Prime Minister Mulroney
  - 1989: President Bush/Prime Minister Mulroney commit to negotiate air quality agreement

- 1991: Canada-U.S. Air Quality Agreement (AQA)
  - Signed in March 1991, originally to address acid rain
  - Established an instrument to address shared concerns regarding transboundary air pollution
  - General objective: to control transboundary air pollution between the two countries

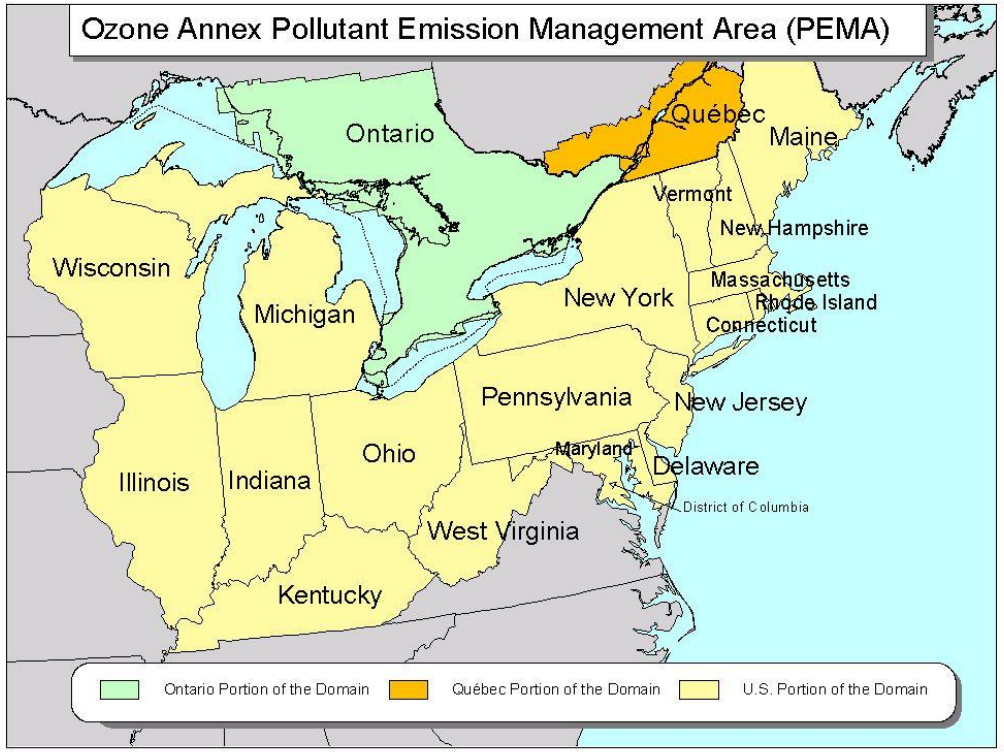
- 2000: AQA amended to add commitments on ground-level ozone

# Air Quality Agreement - Basics

- Establishes framework for the obligations of both countries, including:
  - Specific objectives to limit or reduce emissions, timetables, programs for implementation
  - Requirement to provide prior notification of construction of relevant new sources of air pollution and other major actions
  - Provision to consult on and settle disputes as appropriate
  - Establishment of a bilateral Air Quality Committee responsible for overall implementation of the agreement
  - Cooperation on scientific and technical activities and economic research related to controlling transboundary air pollution
  - Requirement to review, assess, and regularly report on progress under the Agreement

# Air Quality Agreement - Commitments

- The AQA includes three annexes:
  - Acid Rain (Annex 1) – to address emissions of $SO_2$ and $NO_x$
    - Reduction commitments (see next slide)
    - Compliance monitoring
    - Prevention of air quality deterioration and visibility protection
  - Scientific Cooperation (Annex 2) – to coordinate/cooperate on scientific and technical activities, economic research
    - Develop joint emission inventories
    - Coordinate monitoring networks and data exchange
  - Ozone (Annex 3) – added in 2000 – to address precursors to ground level ozone: $NO_x$ and VOCs
    - Reduction commitments (see next slide)
    - Establishment of a Pollutant Emissions Management Area (PEMA) for ozone



# Air Quality Agreement – Commitments Acid Rain (1991)

See Annex 1, 2 and 3 for comprehensive list of commitments, which include:

- $SO_2$
  - ***Canada***:
    - By 1994, reduce annual $SO_2$ emissions in seven most eastern provinces to 2.3 million metric tons
    - By 2000, permanent national $SO_2$ emissions cap of 3.2 million metric tons
  - ***U.S.***:
    - By 2000, reduction of total annual emissions of $SO_2$ by 10 million short tons from 1980 levels

- $NO_x$
  - ***Canada***:
    - By 2000, reduce annual national stationary source $NO_x$ emissions of 100,000 metric tons below the year 2000 forecast level of 970,000 metric tons
  - ***U.S.***:
    - By 2000, reduce annual $NO_x$ emissions 2 million short tons

# Air Quality Agreement – Commitments Ozone (2000)

- Mobile Sources of $NO_x$ and VOCs
  - ***Canada***: Implementation of stringent $NO_x$ and VOC emissions reduction standards for vehicles, including cars, vans, light-duty trucks, off-road vehicles, small engines, and diesel engines, as well as fuels
  - ***U.S.***: Implementation of existing U.S. vehicle, nonroad engine, and fuel quality rules to achieve both VOC and NOx reductions

- Stationary Sources of $NO_x$
  - ***Canada***: By 2007, annual caps of 39 thousand metric tons of $NO_x$ emissions from fossil-fuel power plants in the Ontario portion of the PEMA in and 5 thousand metric tons of NOx in the Quebec portion of the PEMA
  - ***U.S.***: Implementation of the NOx emissions reductions program, known as the NOx SIP Call, in the PEMA states that are subject to the rule

# Air Quality Agreement – Commitments Scientific and Technical Activities and Economic Research

- Determine and report on air pollutant concentrations and deposition
- Determine and report air emissions levels, historical trends, and projections
- Cooperate and exchange information
- Consult on approaches, share information and results of research

# Governance: Air Quality Committee

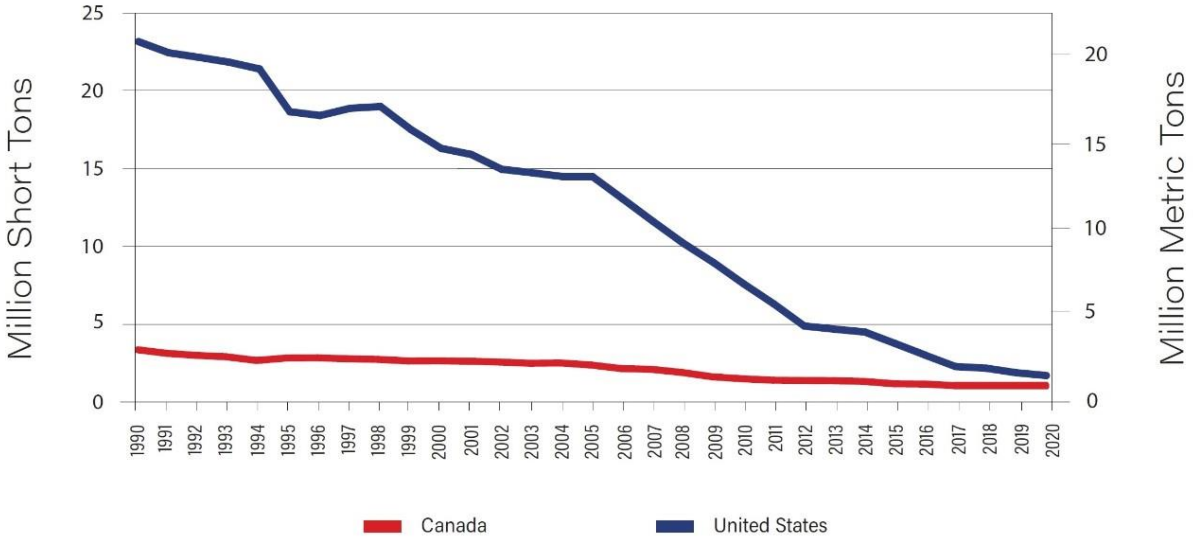
- Air Quality Committee (AQC) implements the AQA and tracks progress
  - Co-chaired by U.S. State Department and Environment and Climate Change Canada (ECCC)
  - Participation includes:
    - U.S.: Department of State, Environmental Protection Agency (EPA), States;
    - Canada: Environment and Climate Change Canada, Health Canada, Provinces

- Two bilateral subcommittees
  - Subcommittee 1: Program Monitoring and Reporting (EPA/ECCC)
  - Subcommittee 2: Scientific Cooperation (EPA/ECCC)

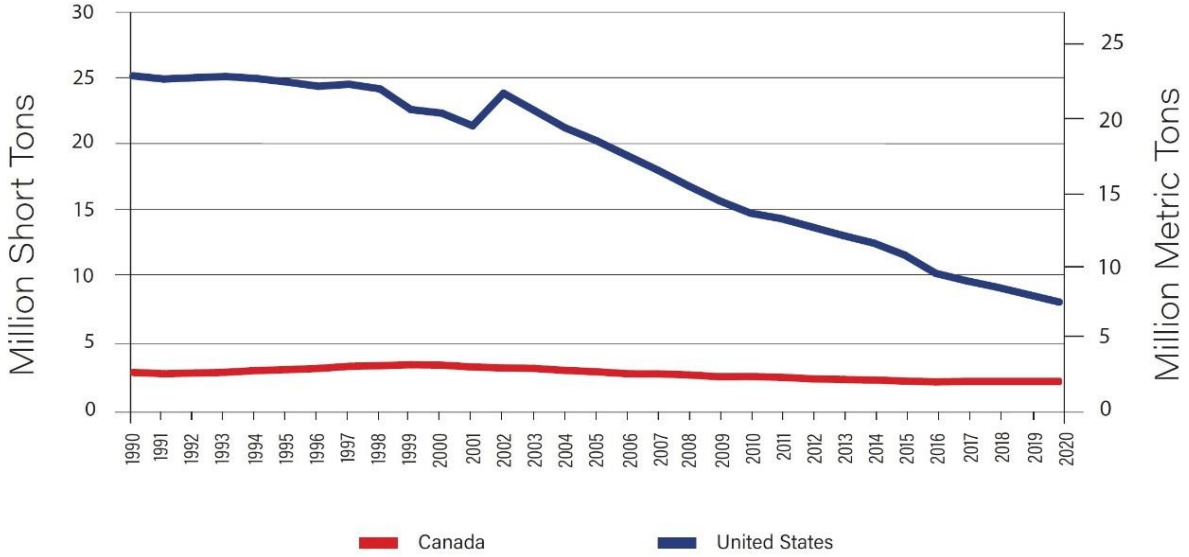
- Air Quality Committee:
  - Meets at least once a year
  - Produces biennial Progress Reports and five-year Reviews of the Agreement
    - Copies of all reports can be found at:
      - https://www.epa.gov/international-cooperation/us-canada-air-quality-agreement-progress-reports
      - https://publications.gc.ca/site/eng/9.506241/publication.html
  - Develops other studies as warranted
  - Collaborates via Subcommittees throughout the year

# Air Quality Agreement – Achievements
# Acid Rain

**National $SO_2$ Emissions in the United States and Canada from All Sources, 1990-2020**



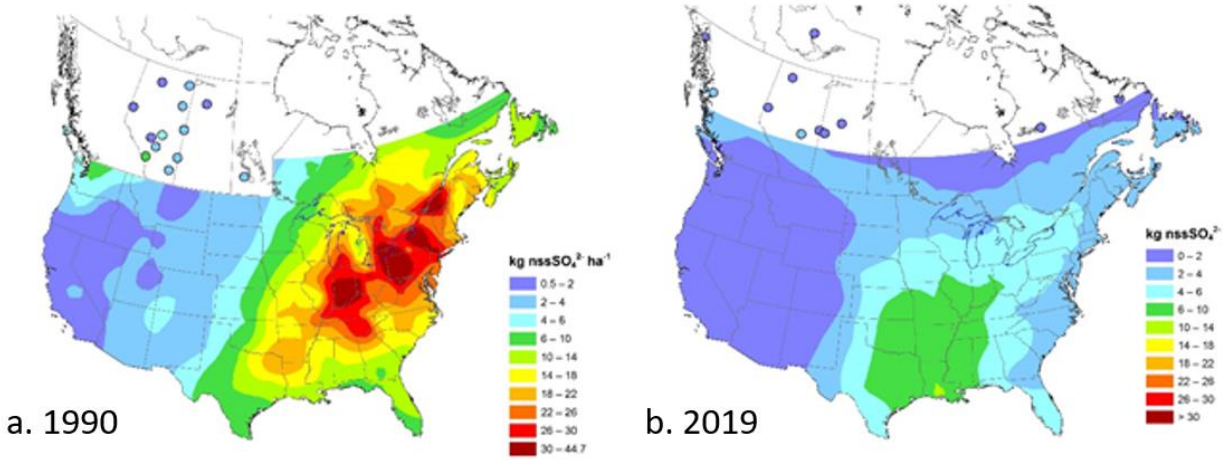

**National $NO_x$ Emissions in the United States and Canada from All Sources, 1990-2020**



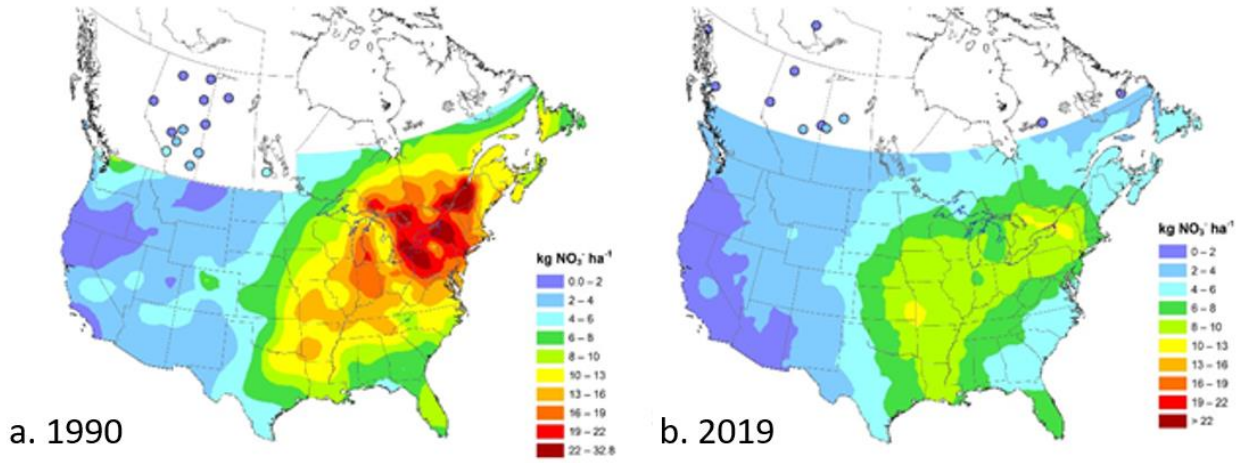

- Canada and the U.S. have both met their commitments to reduce $SO_2$ and $NO_x$ from power plants, vehicles, and other sources
- In Canada, between 1990 and 2020, total $SO_2$ emissions decreased by 78% and $NO_X$ emissions decreased by 36%
- In the U.S., between 1990 and 2020, $SO_2$ emissions decreased by 93% and $NO_X$ emissions decreased by 70%,

# Air Quality Agreement – Achievements
# Acid Rain

**Annual $nssSO_4^{2-}$ wet deposition for (a) 1990 and (b) 2019**



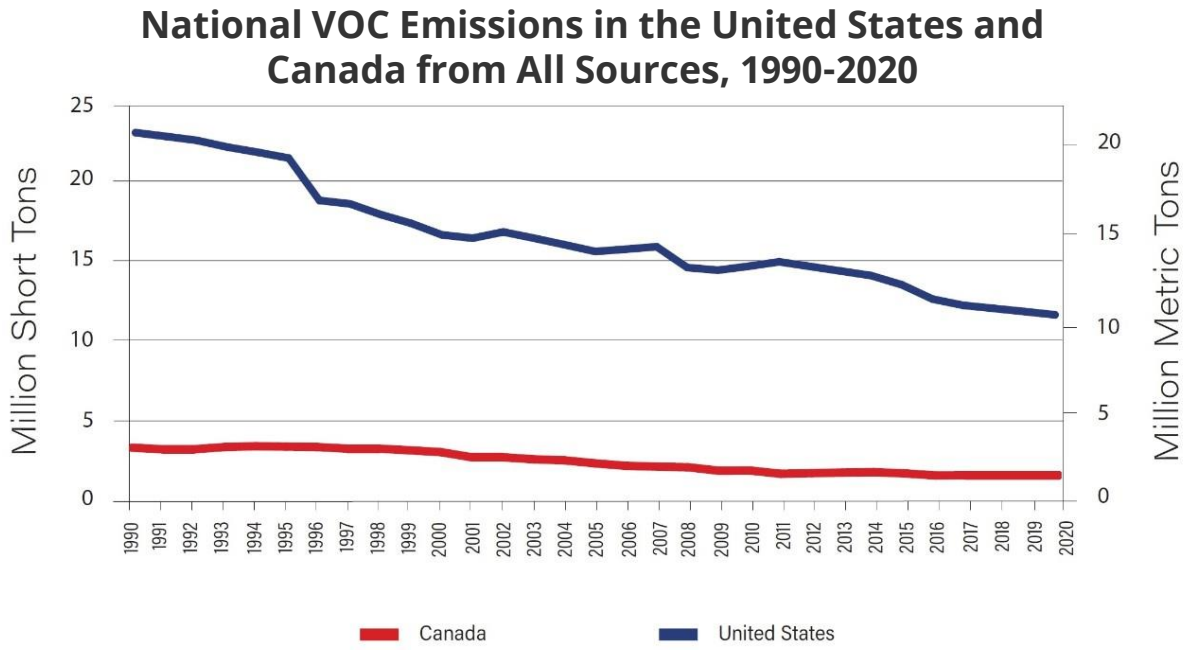

**Annual wet $NO_3^-$ deposition for (a) 1990 and (b) 2019.**




- The lower Great Lakes region consistently received the highest wet deposition of both sulphate and nitrate in the 30-year period
- In 1990 sulfate deposition exceeded 26 kg $nssSO_4^{2-}$ $ha^{-1}$ over a large area of eastern North America
- In 2019, only a small area on the gulf coast exceeded 10 kg $nssSO_4^{2-}$ $ha^{-1}$

- In 1990 nitrate deposition exceeded 19 kg $NO_3^-ha^{-1}$ in many parts of the northeastern U.S. and southern Ontario and Quebec
- In 2019, nitrate deposition was less than 13 kg $NO_3^-$ $ha^{-1}$ throughout North America, except for a small area of eastern Lake Erie, which is still below 16 kg $NO_3^-ha^{-1}$

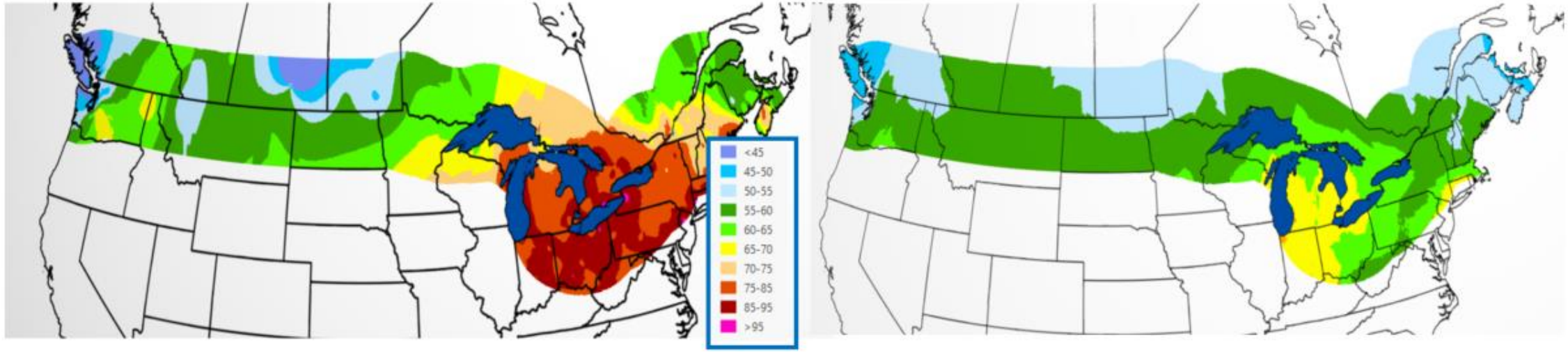
# Air Quality Agreement – Achievements
# Ozone




- Canada and the U.S. have met their commitments in the Ozone Annex to reduce emissions of $NO_X$ and VOCs from stationary and mobile sources and from solvents, paints, and consumer products
- Canada's national emissions of $NO_X$ and VOCs decreased by 36% and 49% respectively between 1990 and 2020
- U.S. national emissions of $NO_X$ and VOCs decreased by 70% and 48% respectively between 1990 and 2020

# Air Quality Agreement – Achievements
# Ozone

**Ozone concentrations (three-year average of the annual 4th highest MDA8 ozone concentration) along the Canada-U.S. border**




a. 2000-2002

b. 2018-2020

- For 2000-2002, the highest ozone concentrations were generally located in the Great Lakes-St. Lawrence region, the upper midwestern and northeastern U.S., southern Ontario, southern Quebec, and the southern Maritimes
- By 2018-2020, ozone concentrations are much decreased compared to 2000-2002. However, higher ozone concentrations still occur near the Great Lakes and along the U.S. eastern coast

# Air Quality Agreement – Further cooperation

- Publication of 15 joint biennial progress reports under the Agreement
- Publication of several joint science assessments on transboundary ozone and $PM_{2.5}$
- Establishment of work plans for cooperation on vehicle and engine emissions and for addressing emissions from the oil and gas sector
- The Agreement has also served as an effective mechanism for scientific cooperation and bilateral exchange of credible information to inform policy recommendations
- Agreement has provided a collegial avenue to address issues of concern regarding pollution sources, which has proven beneficial and effective
- Publication of joint Review and Assessment for the AQA (2024)

# Recent Review and Assessment

- Article X of the AQA calls for Canada and the U.S. to conduct a comprehensive review and assessment of the Agreement and its implementation every five years unless otherwise agreed upon.

- The objectives of the most recent review and assessment included:
  - Reviewing what the AQA has accomplished to date, including whether it is meeting its current objectives
  - Assessing whether the emissions reduction targets remain appropriate for Canada/U.S. policy and science needs; and
  - Examining whether new actions such as updated new commitments would be appropriate (*e.g.*, $PM_{2.5}$ not currently addressed).

# AQA Review: Key Findings

### *General*

- Although emissions of pollutants contributing to acid rain and ozone have decreased significantly since the Agreement was established in 1991, transboundary air pollution continues to affect communities and the surrounding natural environment.
- Pollutants covered by the Agreement ($SO_2$, $NO_X$, VOCs, and ozone) continue to impact human health and the environment in both countries and remain a concern.

### *Acid Deposition*

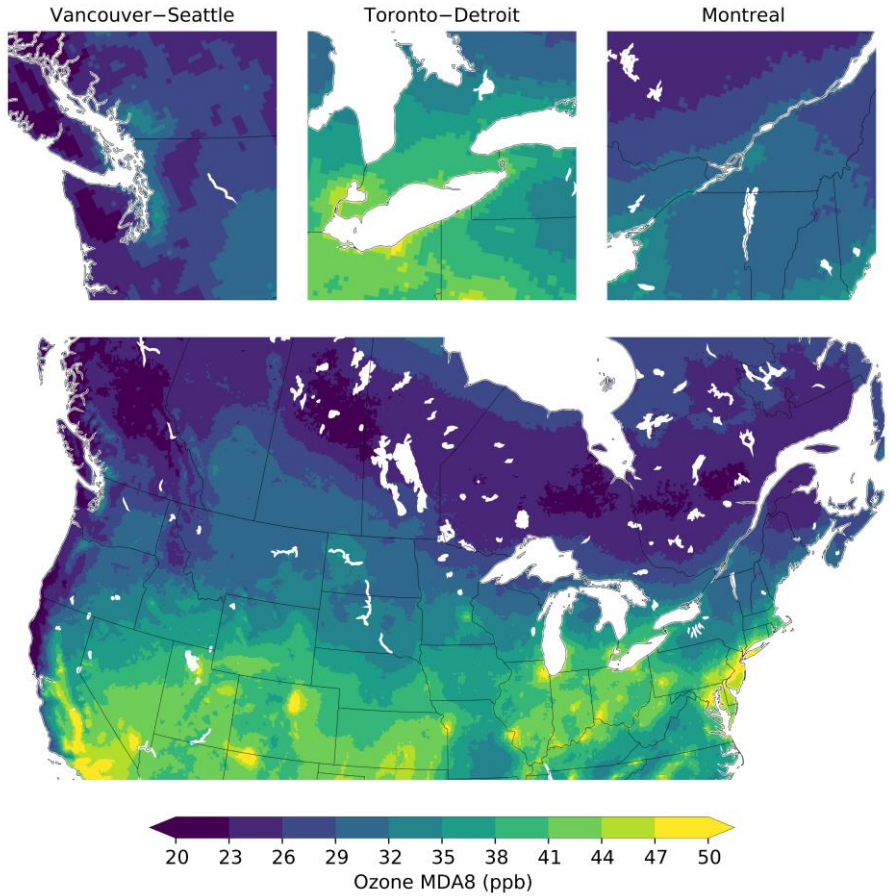
- Success in both countries in reducing acid deposition. Nevertheless, there are some areas in both countries, most notably in eastern Canada, where acid deposition from transboundary sources remains a concern.
- Many water bodies in Canada, as well as some in the U.S., are still exposed to levels of acidity that exceed the capacity of soils and surface waters to neutralize.

# AQA Review: Key Findings

***Ozone***

- Ozone continues to have significant impacts on public health and agricultural production in the U.S. and Canada
- Transport from the U.S. continues to contribute to a large fraction of anthropogenic ozone in Canada
- Areas in southern Ontario and southern Quebec have higher ozone concentrations which approach or exceed the 2020 ozone Canadian Ambient Air Quality Standard (CAAQS) of 62 ppb and modeling projections suggest continued exceedances in 2035
- Modeling suggests that transboundary flow of ozone and its precursors from the U.S. to Canada contributes to a significant portion of health impacts in parts of Canada
- Transboundary flow from the U.S. into Canada is also estimated to contribute to reduced crop yield, particularly along the Windsor-Quebec City corridor

Summer MD8 Ozone
ECCC 2035 Projection

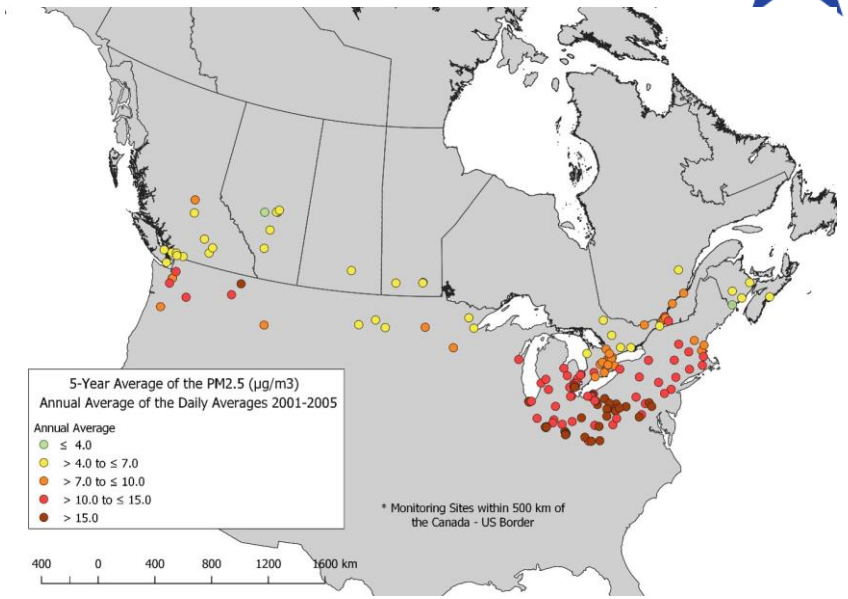


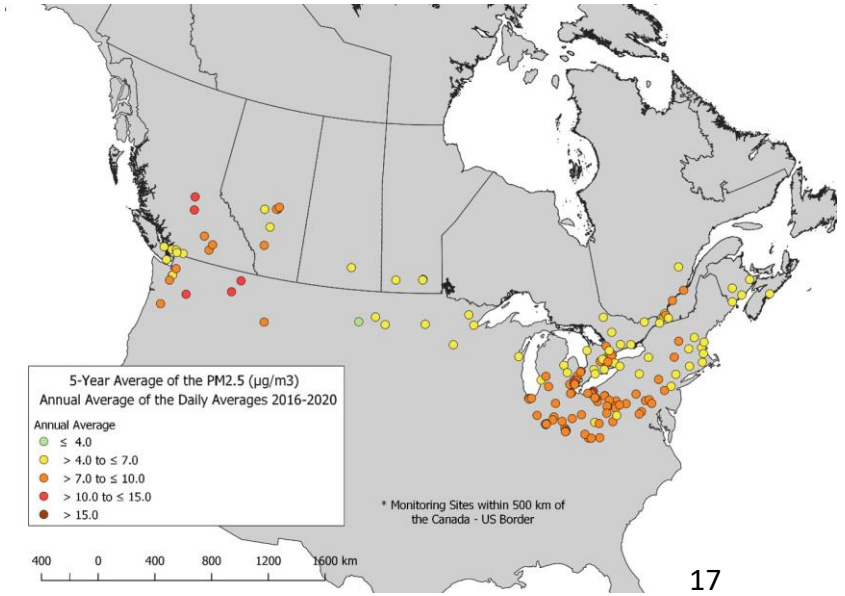
# AQA Review: Key Findings

***Fine Particulate Matter ($PM_{2.5}$)***

- Primary $PM_{2.5}$ and ammonia are not addressed under the Agreement
- Primary $PM_{2.5}$ emissions have plateaued in recent years and emissions of ammonia have increased in both Canada and the U.S.
- $PM_{2.5}$ concentrations are largest near urban areas and particularly in the Ohio Valley, Atlantic coast, and the Windsor-Quebec corridor
- Modeling projects that $PM_{2.5}$ concentrations will decrease by 2035, but will continue exceed the 2020 CAAQS in some of Canada's largest cities
- The majority of transboundary $PM_{2.5}$ impacts are within several hundred kilometers of the border, predominantly in the Michigan-Ontario and Quebec regions

**The full report of the Review and Assessment (2024) can be found here:**
https://www.epa.gov/system/files/documents/2024-03/review-and-assessment-of-the-canada-us-aqa-508-compliance.pdf



# AQA: Next Steps

- At the 2023 meeting of the Canada-U.S. Air Quality Committee, both parties agreed to seek authority to negotiate amendments to update the Agreement.

- Negotiations to update the AQA are anticipated to begin in 2024.

# Annexes

# Annex 1: Acid Rain Commitments

| Objectives | Canada | U.S. |
|---|---|---|
| $SO_2$ | • By 1994, reduce annual $SO_2$ emissions in the seven easternmost provinces to 2.3 million metric tons.<br>• From 1995 to 1999, an annual emissions cap in the seven easternmost provinces at 2.3 million metric tons of $SO_2$.<br>• By 2000, permanent national emissions cap of 3.2 million metric tons per year of $SO_2$. | • By 2000, reduce annual $SO_2$ emissions by approximately 10 million short tons from 1980 levels, taking into account credits ('allowances") earned for reductions from 1995 to 1999.<br>• By 2010, permanent national emissions cap of 8.95 million short tons of $SO_2$ per year for electric utilities.<br>• Beginning in 1995, national $SO_2$ emissions cap of 5.6 million short tons for industrial sources. |
| $NO_X$ | • By 2000, reduce annual national stationary source $NO_X$ emissions of 100,000 metric tons below the year 2000 forecast level of 970,000 metric tons.<br>• By 1995, develop further annual national emission reduction requirements from stationary sources to be achieved by 2000 and/or 2005.<br>• Implement a more stringent mobile source $NO_X$ control program. | • By 2000, reduction of total annual emissions of $NO_X$ by 2 million short tons.<br>• Implement stationary source control program for electric utility boilers.<br>• Implement a mobile source $NO_X$ control program. |
| Compliance Monitoring | • By 1995, estimate $SO_2$ and $NO_X$ emissions from new electric utility units and existing electric utility units greater than 25 MWe (megawatts electrical) using methodologies like continuous emissions monitoring (CEM) and investigate feasibility of using and implementing CEM, where appropriate.<br>• Work towards utilizing comparably effective methods of emission estimation for $SO_2$ and $NO_X$ emissions from all major industrial boilers and process sources, including smelters. | • By 1995, require new electric utility units and existing units greater than 25MWe operate CEM systems.<br>• Work towards utilizing comparably effective methods of emission estimation for $SO_2$ and $NO_X$ from all major industrial boilers and process sources, including smelters. |
| Prevention of Air Quality Deterioration and Visibility Protection | • By 1995, develop and implement means (comparable to those in the U.S.) for achieving levels of prevention of significant air quality deterioration and protection of visibility with respect to sources that could cause significant transboundary air pollution. | • Maintain means for preventing significant air quality deterioration and protecting visibility with respect to sources that could cause significant transboundary air pollution. |

[1] One metric ton is equal to approximately 1.1 short tons.
[2] One short ton is equal to approximately 0.91 metric tons.

# Annex 2: Scientific and Technical Activities and Economic Research Commitments

| Joint Commitments | Description |
|---|---|
| **1. Determine and report on air pollutant concentrations and deposition:** | The Parties agree to coordinate air pollution monitoring through:<br>• Coordination of existing networks;<br>• Additions to monitoring tasks of existing networks of those air pollutants Parties agree should be monitored;<br>• Addition of stations or networks where no existing monitoring facility can perform a necessary function for the purposes of the Agreement;<br>• The use of compatible data management procedures, formats, and methods, and;<br>• The exchange of monitoring data, modeling, and comparison of methods |
| **1. Determine and report air emissions levels, historical trends, and projections** | The Parties agree to coordinate activities through:<br>• Identification of air emissions information that should be exchanged for purposes of the Agreement;<br>• Use of measurement and estimation procedures of comparable effectiveness and data management formats and methods, and;<br>• Exchange of air emissions information. |
| **1. Cooperate and exchange information** | The Parties agree to share Information related to:<br>• Monitoring the effects of changes in air pollutant concentrations and deposition with respect to changes in various effects categories;<br>• Determination of any effects of atmospheric pollution on human health and ecosystems;<br>• Development and refinement of atmospheric models for purposes of determining source receptor relationships and transboundary transport and deposition of air pollutants;<br>• Development and demonstration of technologies and measures for controlling emissions of air pollutants, in particular acidic deposition precursors, subject to their respective laws, regulations and policies;<br>• Analysis of market-based mechanisms, including emissions trading;<br>• Any other scientific activities or economic research the Parties may agree upon. |
| **4. Consult on approaches to, and share information and results of research** | The Parties agree to consult on:<br>• Methods to mitigate the impacts of acidic deposition, including environmental effects<br>• Economic aspects of methods to mitigate the impacts of acidic deposition |

# Annex 3: Ozone Commitments

| Objective | Canada | U.S. |
|---|---|---|
| **Mobile Sources of $NO_X$ and VOCs** | • Implementation of stringent $NO_X$ and VOC emissions reduction standards for vehicles, including cars, vans, light-duty trucks, off-road vehicles, small engines, and diesel engines, as well as fuels. | • Implementation of existing U.S. vehicle, nonroad engine, and fuel quality rules to achieve both VOC and $NO_X$ reductions. |
| **Stationary Sources of $NO_X$** | • By 2007, annual caps of 39 thousand metric tons of $NO_x$ emissions from fossil-fuel power plants in the Ontario portion of the PEMA in and 5 thousand metric tons of $NO_x$ in the Quebec portion of the PEMA<br>• Development of a proposed national Guideline for Renewable Low-Impact Electricity. | • Implementation of the $NO_X$ emissions reductions program, known as the $NO_x$ SIP Call, in the PEMA states that are subject to the rule. |
| **$NO_X$ and VOCs Emission Reduction Strategies** | • Implementation of measures to reduce $NO_X$ emissions from key industrial sectors, and VOC emissions from solvents, paints, and consumer products to attain the Canada-wide Standard for Ozone.<br>• Implementation of Ontario and Quebec specific measures to reduce emissions of $NO_x$ and VOCs in the PEMA region | • Implementation of existing U.S. rules for control of emissions from stationary sources of hazardous air pollutants and control of VOCs from consumer and commercial products, architectural coatings, and automobile repair coatings.<br>• Implementation of 36 existing U.S. new source performance standards, to achieve VOC and $NO_X$ reductions from new sources. |
| **Anticipated Additional Control Measures and Indicative Reductions** | • Implementation of anticipated additional control measures that are expected to contribute to overall reductions of $NO_X$ and VOC emissions. | |
| **Reporting** | • Beginning in 2004, Parties agreed to report annual and ozone season (typically January until May across the U.S.) emissions of $NO_X$ and VOCs for the PEMA;<br>• Beginning in 2002, Parties agree to report on ambient ozone, $NO_X$ and VOC concentrations, and 10-year trends within 500 km of the Canada-U.S. border. | |
| **Revisiting** | • In 2004, assess progress in implementing the annex with a view to negotiating further reductions;<br>• At the request of either Party, discuss the possibility of amending the annex to designate additional PEMAs or to revise annex commitments | |
| **More Stringent Measures** | • Either Party may take more stringent measures to control and reduce $NO_x$ and VOC emissions than those specified in this Annex. | |

# Key AQA Personnel

| U.S.-Canada AQA Key Personnel | | |
|---|---|---|
| **Contact** | **Position** | **Email** |
| Erika Sasser (EPA) | U.S. SC1 Co-Chair | Sasser.erika@epa.gov |
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| Andrew Clark (State Department) | U.S. State Department POC | ClarkAD@state.gov |
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# AQA Governance Structure

- AQA established a bilateral Air Quality Committee (AQC), responsible for coordinating overall implementation of the Agreement.