

Ontario's Experience with Air Quality Index, Smog Advisory, and Smog Alert Response Programs

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The Air Quality Index (AQI)

- Provincial air quality monitoring and information system
- Provides the Ontario public with continuous measure of air quality on a real-time basis
- Considers up to 6 common air pollutants:
 - Carbon Monoxide (CO)
 - Fine Particulate Matter (PM_{2.5})
 - Nitrogen Dioxide (NO₂)
 - Ozone (O₃)
 - Sulphur Dioxide (SO₂)
 - Total Reduced Sulphur Compounds (TRS)

AQI

Index

Category

0 - 15



Very Good

16 - 31



Good

32 - 49



Moderate

50 - 99



Poor

100+



Very Poor

Attributes of the AQI System

- Be readily understandable by the public
- Be consistent with perceived air quality
- Include any measured pollutant or combination of pollutants for which there are criteria on effects
- Be expandable in the future to pollutants not presently measured or for which criteria are at present unavailable

Modification of the AQI Sub-Index for Ozone

[1995]

- To reflect new data from an expert panel engaged by Health Canada on the health and terrestrial effects of ozone
- Effects are more pronounced at lower concentrations than previous scientific information indicated
- Ground-level ozone became the dominant pollutant in the AQI and the main pollutant associated with moderate and poor AQI levels

Comparison of Old and New Ranges of Ozone Concentration for Each AQI Category

Category	<i>Old Cutoff Concentrations</i> (ppb)		<i>New Cutoff Concentrations</i> (ppb)	
	Low	High	Low	High
Very Good	0	50	0	23
Good	51	80	24	50
Moderate	81	120	51	80
Poor	121	199	81	149
Very Poor	>200		>149	

PM_{2.5} Added to AQI (2002)

- Ontario was the first province in Canada to add PM_{2.5} to the AQI – August 23, 2002.

Figure 1: Comparison of Fine Particle ($PM_{2.5}$) and Suspended Particle (COH) Levels at Etobicoke South During July 14-18, 1999 Smog Episode

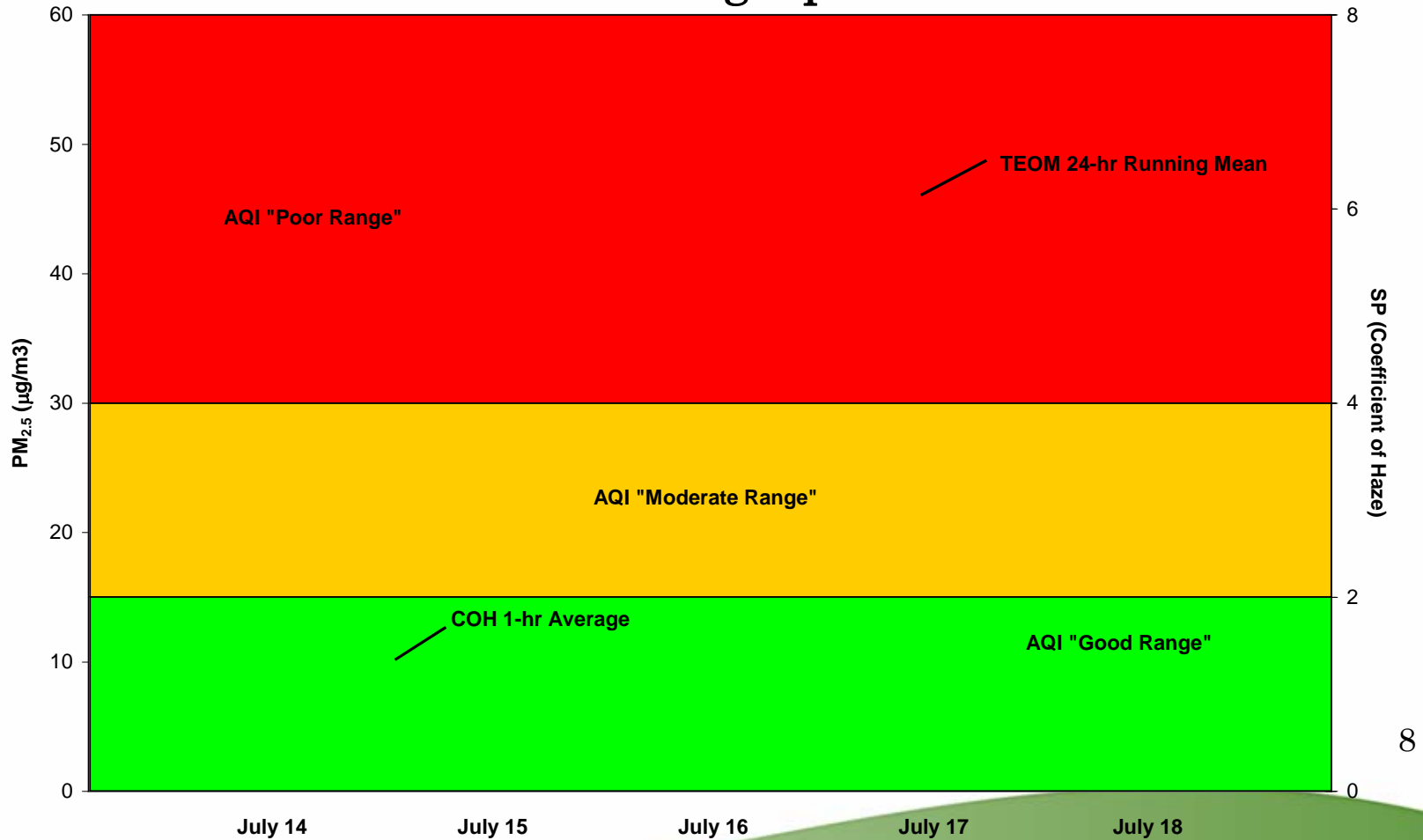
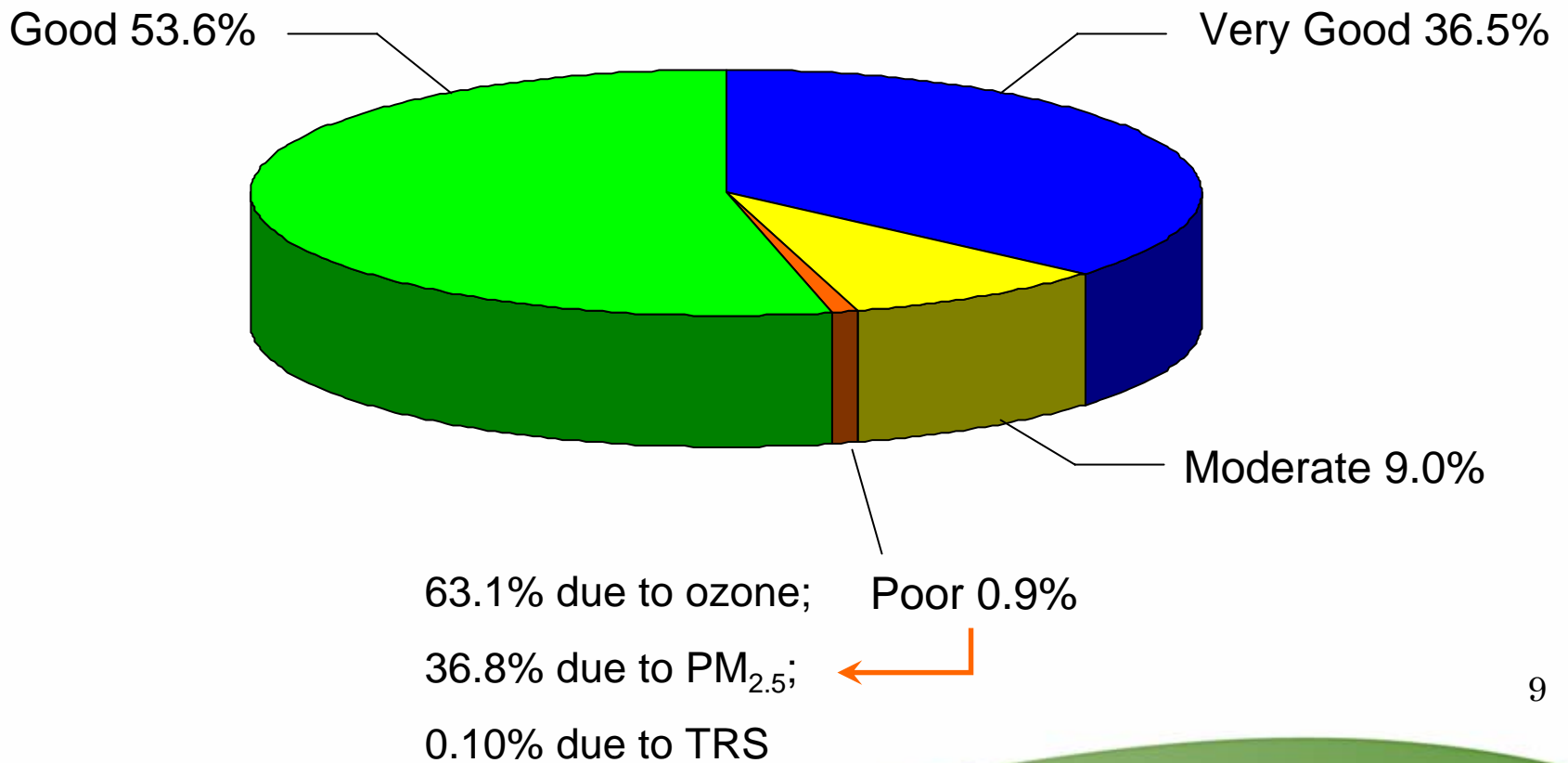


Figure 2: Air Quality Index Summary for Ontario (2003)



Smog Episodes 2003

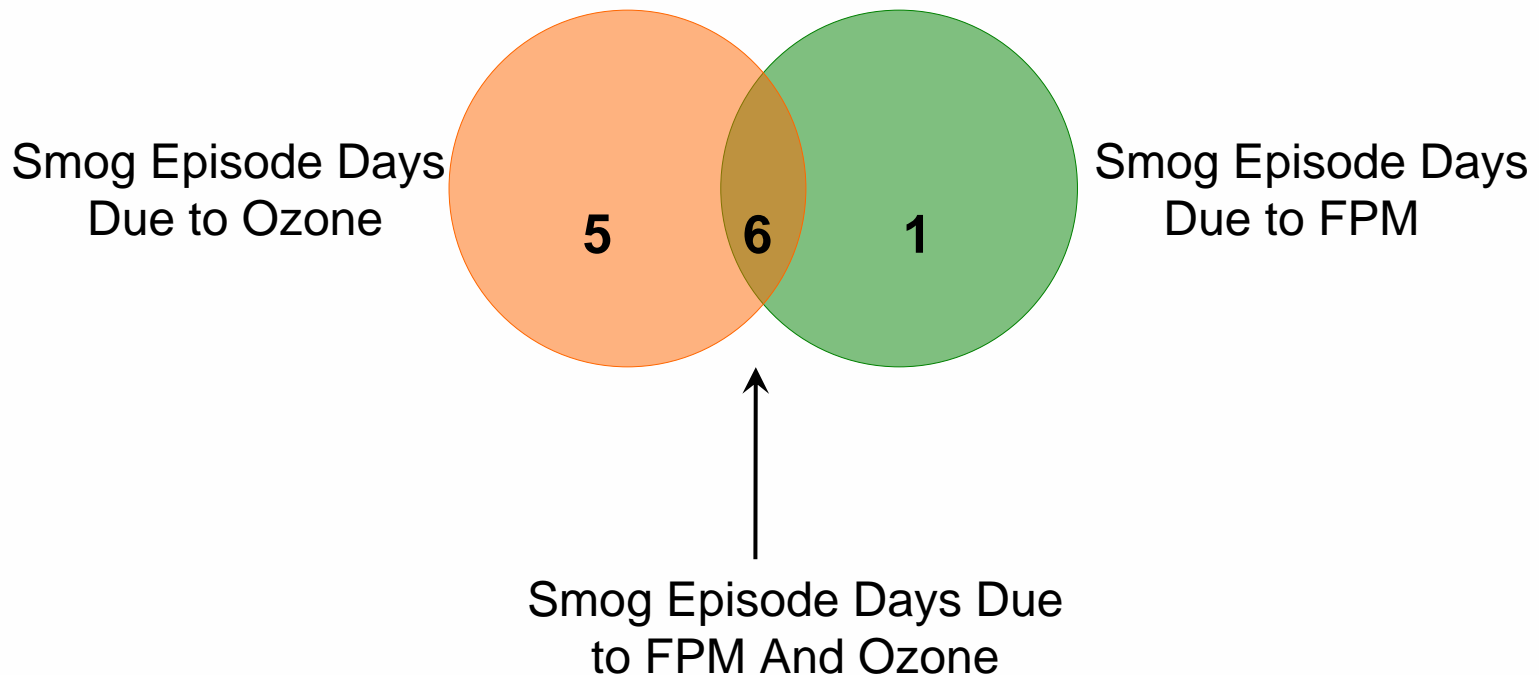
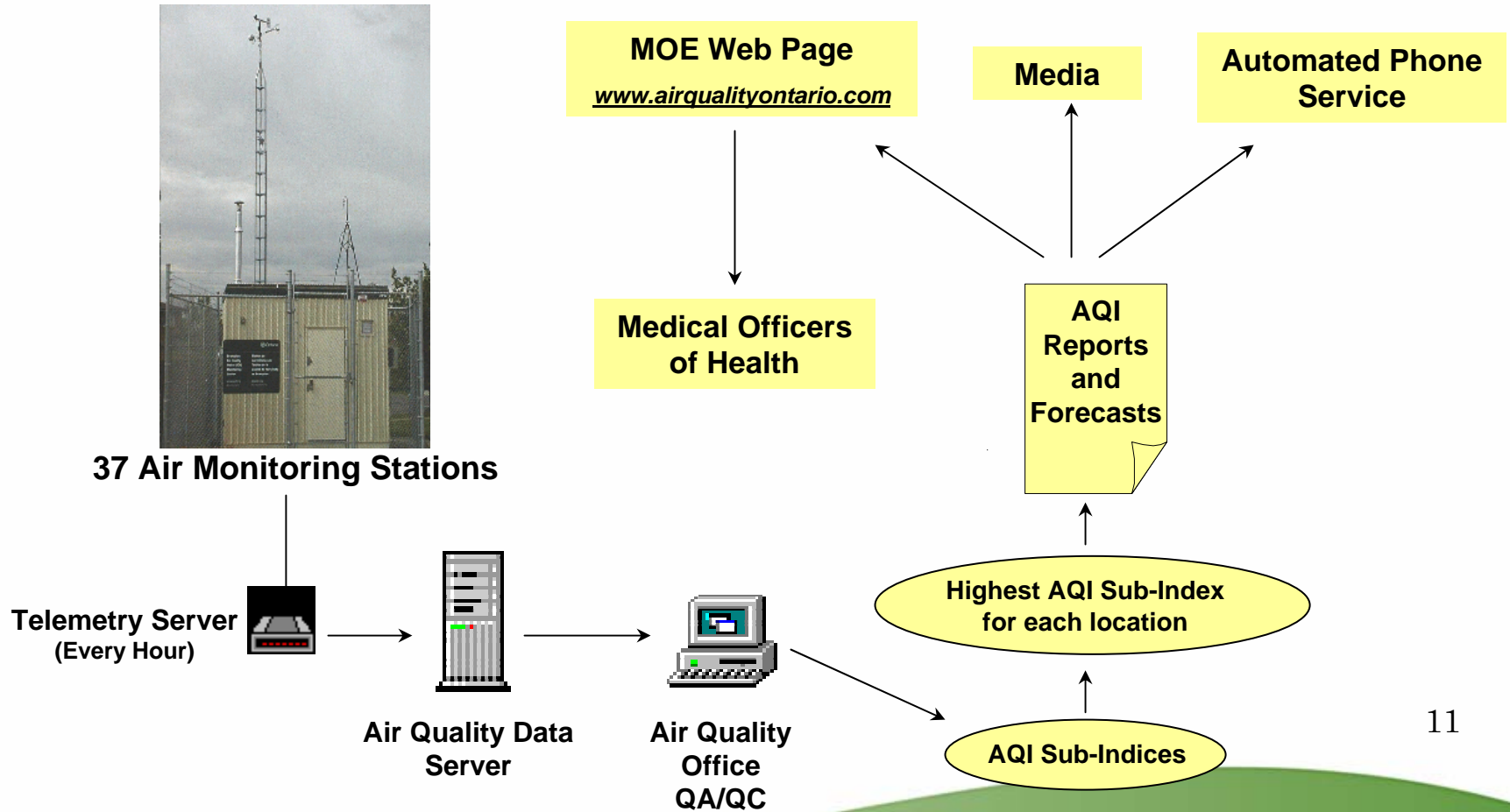


Figure 3: Smog Episode Days in Ontario (2003)

Air Quality Index Reporting



Air Quality Index Monitoring Sites in Ontario (2004)



*Reflective February 20, 2004.

What Are the Uses of the AQI

- Report air quality to the public in a timely manner
- MOE for smog forecasting
- Other jurisdictions for smog forecasting
- Used by academia, NGOs, public, health officials to study short/long-term trends in air quality
- Public to modify their daily activities
- Public to assess relocation options

13

Smog Advisory Program

- Smog advisories issued jointly by the Ministry of the Environment and Environment Canada since 1993
- Program built on existing AQI system and covers southern Ontario and as far north as North Bay, Sudbury and Sault Ste. Marie
- Advisories issued when wide-spread elevated and persistent air pollution levels are forecast i.e. AQI expected to exceed the poor threshold of 50, regionally, due to ground level ozone and/or PM_{2.5}
- Smog advisory is issued immediately if a smog day* occurs without warning and weather conditions conducive to elevated smog are forecast to continue for six hours

* widespread, elevated and persistent poor air quality due to ozone and/or PM_{2.5}

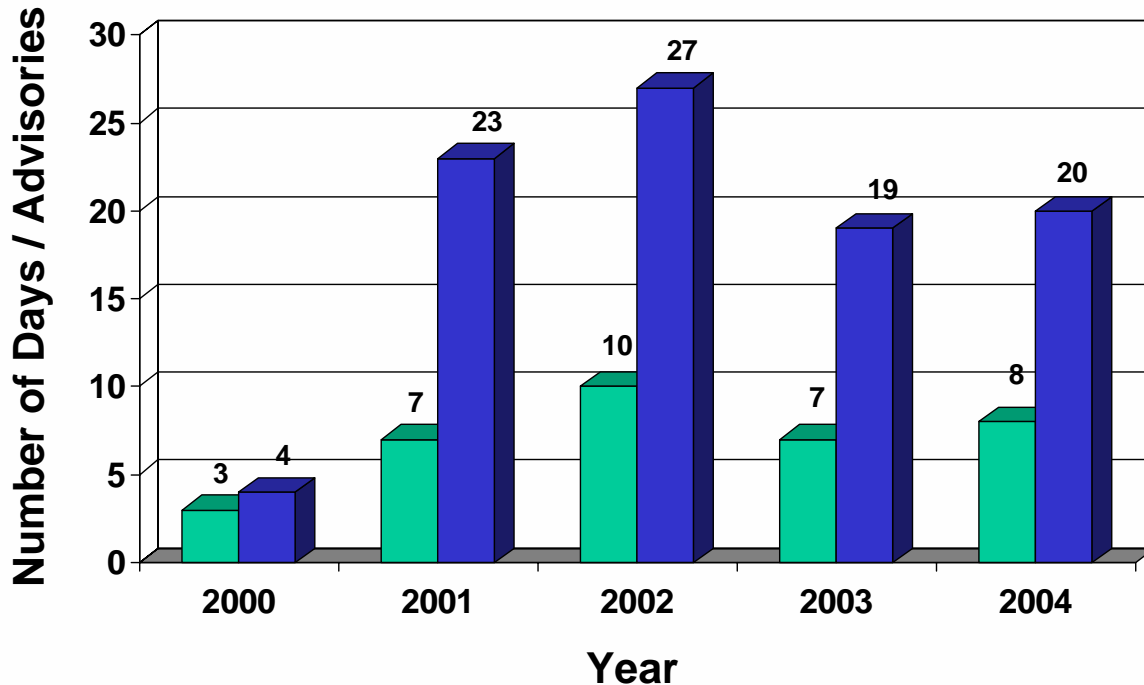
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Smog Alert Program for Ontario

- A 2-staged Smog Alert Program:
 - 1st Stage: “Smog Watch” – potential (50% chance) for elevated smog in any or all forecast regions of the province. Issued 2-3 days before.
 - 2nd Stage: “Smog Advisory” – high potential for elevated smog in any or all forecast regions of the province. Issued 1 day before.
- On May 1, 2000, the Ministry introduced AQI reporting on several rural ozone sites in Ontario (Tiverton, Merlin, Longwoods, Grand Bend, Simcoe, Long Point, Haliburton) and Parry Sound.
- The new MOE Web site allows the public to “sign up” for email-based smog alerts via the internet and provides 1, 2 and 3-day smog forecasts, and historical AQI values.

15

Figure 4: Summary of Smog Advisories in Ontario (2000 – 2004)



- Number of Advisories Issued
- Number of Days in Duration

The number and duration of smog advisories are highly dependent on weather conditions and vary from year to year.

Smog Advisory Notification

- **Example:** A SMOG ADVISORY* has been issued by the Ontario Ministry of the Environment for the following forecast regions:

For: Friday May 14, 2004

- Ottawa-Prescott-Russell-Cornwall

The SMOG ADVISORY (issued on a previous date) for the following forecast region(s) is still in effect:

- Algonquin: From May 13, 2004
- Barrie-Huron-Simcoe County: From May 13, 2004
- Brant-Haldimand-Norfolk: From May 13, 2004
- Elgin: From May 13, 2004
- Haliburton: From May 13, 2004
- Halton-Peel: From May 13, 2004
- Hamilton: From May 13, 2004
- Huron-Perth: From May 13, 2004
- Kingston-Brockville: From May 13, 2004
- London-Middlesex-Oxford: From May 13, 2004
- Niagara: From May 13, 2004
- Parry Sound-Muskoka: From May 13, 2004
- Peterborough and the Kawarthas: From May 13, 2004
- Prince Edward County: From May 13, 2004
- Quinte-Northumberland: From May 13, 2004
- Renfrew: From May 13, 2004

- Smiths Falls-Frontenac-Lanark: From May 13, 2004
- Toronto: From May 13, 2004
- Waterloo-Wellington-Dufferin: From May 13, 2004
- Windsor-Essex-Chatham-Kent: From May 13, 2004
- York-Durham: From May 13, 2004

Advisories will remain in effect until further notice.

For more details visit the Air Quality Ontario website at: www.airqualityontario.com

During the smog episode, individuals may experience eye irritation. Heavy outdoor exercise may cause respiratory symptoms such as coughing or shortness of breath. People with heart or lung disease including asthma may experience a worsening of their condition.



Current Status

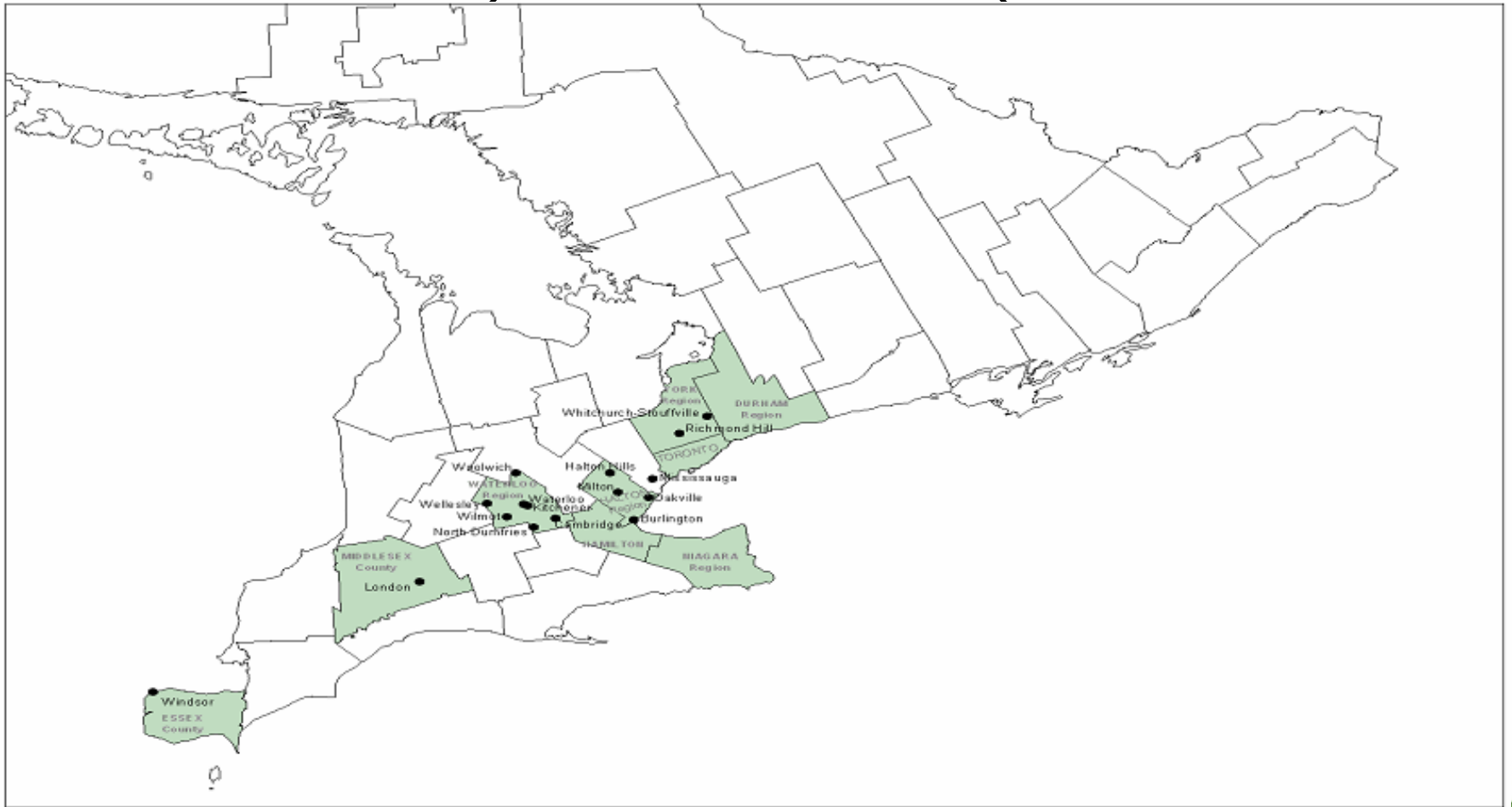
- AQI reading and air quality forecasts are released daily to the public and news media at set intervals. Air Quality information is available toll-free in English (1-800-387-7768) and French (1-800-221-8852), or from the ministry's Web site: www.airqualityontario.com. The public can also subscribe to a Smog Alert e-mail notification service.
- The ministry issues smog advisories when widespread, elevated and persistent smog levels are forecast. A smog advisory is issued immediately if elevated smog conditions occur without warning and the weather conditions conducive to elevated smog are forecast to continue for at least six hours.

Outreach: Increasing Program Effectiveness

- 1) Municipal Level: Smog Alert Response and Activities
- 2) Strengthening the Connection between Smog & Health
- 3) Establishing a Provincial Working Group/Participating in the National Processes
- 4) More effective Media Education.
- 5) Better Summer and Winter Messaging

20

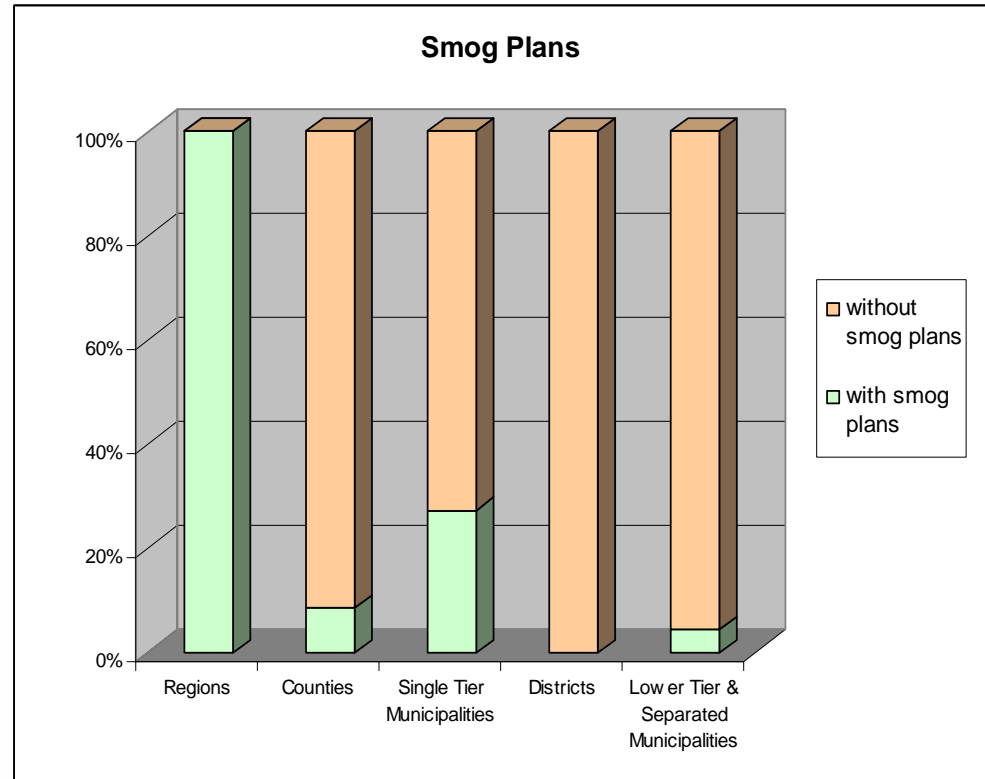
Preliminary Assessment of Municipalities with Smog Plans



Current Status: Municipal Smog Alert Response Plans

Smog Plans in Ontario

- All 6 regions in Ontario have smog plans, some of which are also used by local municipalities
- Over a quarter of all upper-tier municipalities have smog plans (includes regions, counties, districts, and single-tier municipalities)
- Only 18 of the over 400 lower-tier municipalities have smog plans; however, approximately one-third are located in Northern Ontario and others may be covered under an upper-tier plan

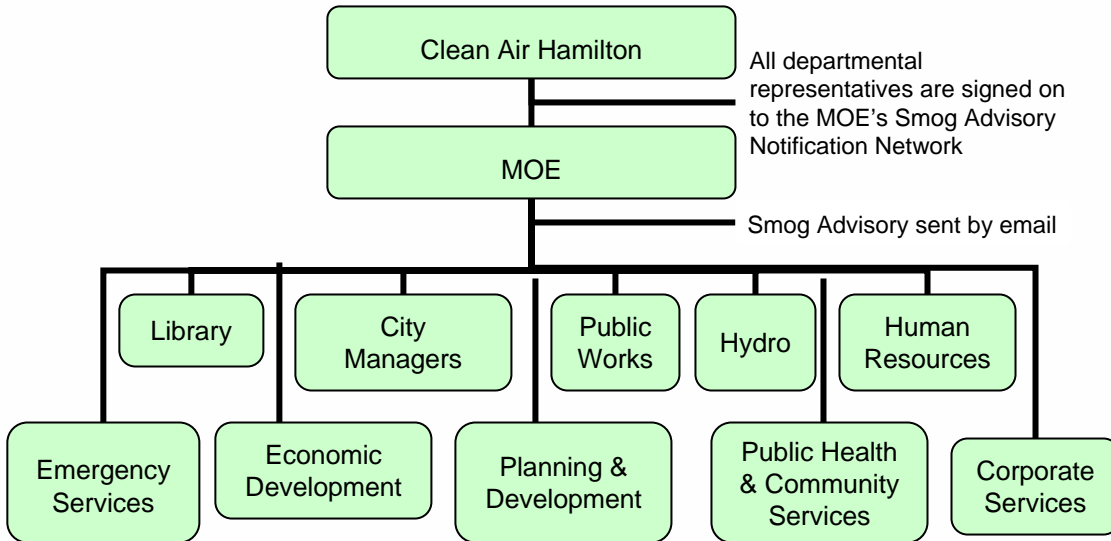


Expand Understanding of Municipal Implementation

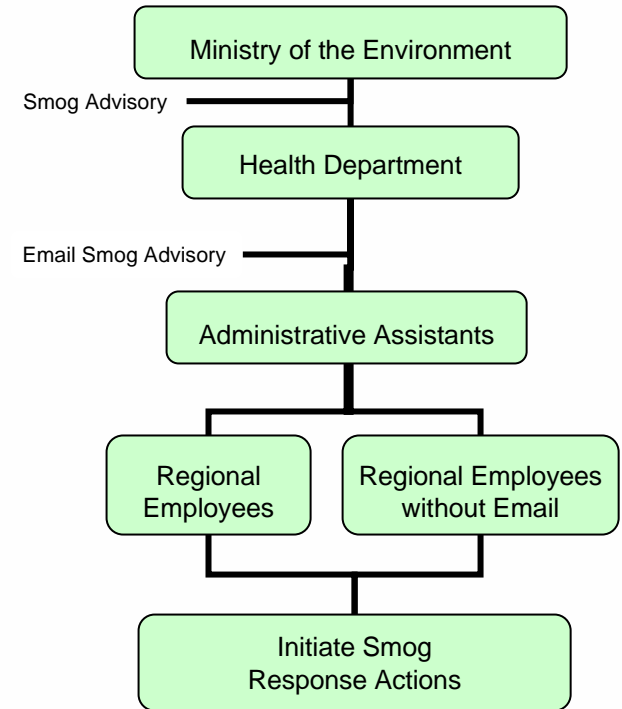
- In 2004-2005, consulted with over 25 municipalities and other stakeholders in Ontario.
 - Developed a better understanding of what is working/not working in their municipalities and actions the Ministry could take to be more effective.
 - Able to pool information and share “best practices” and other ideas with municipalities.
 - Able to help municipalities get started on the development or implementation of their own response plan.

Variations in Notification Process

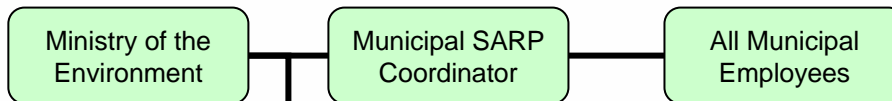
Hamilton "Direct Notification" Style



Durham "Fan-out" Style



Smaller Municipality



Smog Advisory issued

Municipal Action Plans

Departmental Action or Response	Lead	Comments Feedback
Parks and Recreation	Senior Management	
Public Works	Municipal Contractors	
Transportation	Divisional Heads	
Public Health	Medical Officer of Health	
Communications	Air Quality Coordinatorschools not participating
Community Services		
Finance & Admin		
Emergency Response		

- Early notification of departmental heads is critical;
- Feedback on effectiveness of action;
- Experience shows ownership leads to best results;
- Updated each year as new information becomes available.

Examples of Municipal Activities

- Multi-faceted roles for Steering Committees
- Campaigns to Change Behaviour- “Idle-Free campaigns” “trip-chaining” “20/20 Way to Clean Air
- Green Fleets policy and implementation
- Energy audits and Retrofits
- Green space planning and the Green Roofs Program
- Community programs for Sensitive Populations
- Curriculum and School-Based Programs

Factors Influencing Success

- Importance of high level support (council) and dedicated position;
- By-laws (anti-idling, burning, pesticides, etc) combined with community education/ advocacy;
- Pooling resources- financial and knowledge-related;
- Energy audits- reduce emissions from municipal facilities and operations;
- Emphasize dollars saved- economic costs of smog and reduced savings as a result of initiatives.
- Research- provides substance to warrant action (health, emission, social marketing);
- Smart purchasing decisions;
- Better cooperation between all levels of government (regional initiatives);
- Innovative communication strategies- working with media;
- Effective land-use planning;
- Link air quality to other municipal priorities

Ministry-Response to Municipal Consultations

- Development of a Municipal Guide to Smog Alert Response and an Accompanying Toolkit (to be released in June 2005);
- List of Municipal SARP Coordinators- updated to high priority in receiving smog advisories. Ongoing contact with coordinators;
- MOE participation in Steering Committee groups and other forums as requested;
- Dialogue to improve materials and processes: notification process, need for better health messaging, and action based messaging for summer and winter months, the development of “local action plans” as needed, etc.

Strengthening the Health Connection

Research Study		Results
<i>Toronto Burden of Illness Study</i>	2004	<ul style="list-style-type: none"> • 1,700 premature deaths/year and 6,000 hospital admissions as a result of smog.
<i>The USC Children's Health Study</i>	2004 (10 yr span)	<ul style="list-style-type: none"> • 20% lower than expected lung function in children associated with PM, Nitrogen Dioxide and Acid Vapour. • Reductions in air pollution will likely lead to measurable improvements in children's health.
<i>Study O3 and School Absences</i>	2001	<ul style="list-style-type: none"> • 20 ppb increase in O3 was associated with an 83% increase in school absences due to acute respiratory disease.
<i>World Health Organization Report</i>	2004	<ul style="list-style-type: none"> • 100,000 premature deaths associated with fine PM. Increased infant mortality in pollution 'hotspots.' • Reduction in air pollution will lead to considerable health benefits.
<i>American Lung Association</i>	2004	<ul style="list-style-type: none"> • Links ozone exposure to premature deaths across the city.
<i>Atlanta Study –During 1996 Olympics</i>	1997	<ul style="list-style-type: none"> • A 28% reduction in hospitalizations for asthma; • A 44% reduction in medical claims for children.
<i>Ontario Medical Association Study</i>	2000	<ul style="list-style-type: none"> • Ontario's health system spends more than \$1 billion annually on hospital admissions, emergency room visits and absenteeism caused by poor air quality.

Strengthening the Health Connection

EPA Air Quality Conference (2005)

Well Established:

Air pollution causes acute (short-term effects) e.g.:

- Physician visits
- Lung function changes
- Acute symptoms for asthmatics and other susceptible groups

Less Well Understood

Chronic health effects. e.g.:

- reduced lung development,
- onset of asthma
- pre-natal effects, etc.

Strengthening the Health Connection



- Survey of electronic materials available from 37 Health Units across Ontario.
- MOE-MOHLTC stronger cooperation on process and materials with the Health Units (Medical Officers of Health).
- Joint product development being expanded each year. Better linkages between research and outreach.
- Move to involve credible spokespeople from the medical community. “People believe their doctors”.

Provincial/Federal Cooperation

Within Ontario

- OPS Committee- Coordinators from 13 Ministries including transportation, health, energy, Management Board Secretariat and Cabinet Office.
- Ontario Realty Corporation participates on the Committee.
- Electronically ensure Coordinators notified of smog advisory- all provincial employees are aware.
- Informal process- sharing information between Ministries.
- Joint initiatives- “Summary of Initiatives” developed in 2004; Clean Air Commute, etc.

The Federal Process

- Participating in national meetings on health-based messaging, focus groups to test messaging, review of materials being developed through the research/ consultation process.

Getting the Message Out

AQI Toolkit for Weathercasters

Media Education

- Technical briefing for media on Ontario's air quality monitoring program- April 29 2005 (take photos of TAGA, interview with our senior Meteorologist, etc).
- Media kits developed and distributed (fact sheets, posters and brochures).
- Targeting messaging and products designed for specific sensitive groups (children, the elderly, asthmatics, people with heart problems, etc).
- Medical spokespeople made available to respond to media queries.
- Promoting the use of smog related information on a number of websites.



Ongoing Issues

- AQI categories and Air quality standards.
- Cumulative health impacts of multiple pollutants.
- Health messaging to reduce exposure for the average person (indoors versus outdoors) and susceptible populations (children, the elderly, people with lung or heart problems).
- Action messaging that makes sense for both summer & winter.
- Media education: the potential for developing brief clips on the science of smog, etc.
- Pooling resources: working with partners.

These concerns are being addressed both at the provincial level and through the national process.