canada.com
WHERE PERSPECTIVES CONNECT

Thursday » June 21 » 2007

Air confusion index

Smog is down, but smog advisories are up. That creates pressure for costly rules that may do nothing to cut the remaining pollution

Ross McKitrick
Financial Post

Thursday, June 21, 2007

I recently heard a famous Canadian journalist, whom I know to be astute and well-informed, with above-average income and education, give a speech about the environment. He grew up in Muskoka, he said, where they never used to get smog, but now things are so bad that even up there they have started getting smog warnings. And here in Southern Ontario there are now -- for the first time -- smog warnings in the fall and winter, which never used to happen. The gist was that it's high time Ottawa did something.

Leaving aside the fact that air pollution is already governed by provincial regulation, the data certainly back up the claim that smog warnings are getting more common. The chart at top right shows a clear increase in the number of days covered by air-quality alerts in Ontario since 1995.

The recently released report Air Quality in Ontario 2005 by the Ontario Ministry of the Environment, apparently confirms this perception. Page i reads, in part: "There were 15 smog advisories covering 53 days (due to ozone and/or fine particulate matter) in 2005. This is a record number of smog-advisory days." "For the first time ?Ontario issued a winter smog advisory." "A record-breaking number of smog-advisory days were issued in June, 2005 ? " --and so forth.

So you might be surprised to learn, as was the journalist when I told him afterwards, that Ontario air quality has actually been improving, for decades, even in Toronto. Indeed the same Ontario report begins by saying: "Overall, air quality in Ontario has improved significantly over the past 35 years for nitrogen dioxide, carbon monoxide and sulphur dioxide. However, ozone and fine particulate matter, the major components of smog, continue to exceed the ambient air-quality criteria and set reference levels, and thus remain the pollutants of most concern."

You read that correctly. Most major categories of air pollution have fallen, in some cases dramatically, since the 1970s. One, ground-level ozone, has not: While the daily maximum has trended down a bit since 1980, the seasonal means have trended up a bit, making it a wash overall. Another, fine particulates, hasn't been measured long enough to establish a trend.

On its Web site (www.airqualityontario.com/press/faq.cfm), the Ontario Ministry of the Environment says: "Ontario's air quality has improved steadily since 1988. We have good air quality 93% of the time. However, the number of smog alerts is expected to increase, not because air quality in Ontario is getting worse, but because Ministry of the Environment staff are doing a better job at monitoring and reporting changes in air quality across the province."

So the situation is that air pollution has been steady or going down, yet the number of smog warnings is rising, the system is setting new records for the number of days under advisories, and the mismatch between smog warnings and pollution trends is expected to get larger in the future. If you find this a confusing situation, you're not alone -- I can think of at least one journalist who got tripped up on it.

There is a simple reason you don't remember smog warnings from when you were growing up. The system was only set up in 1993, and smog advisories only began in 1995. There were no smog warnings in Muskoka (or anywhere else in Ontario) in the 1960s and 1970s, because there wasn't a smog-warning system. But there certainly was air pollution, almost certainly a lot more than today.

The smog-advisory system is based on the air quality index, or AQI. The AQI uses hourly readings of carbon monoxide, sulphur dioxide, total reduced sulphur (TRS), nitrogen dioxide, fine particulate matter and ground-level ozone. TRS is not a health hazard -- it is just smelly-- so the other five are the ones of primary concern. Each reading is put on to a scale from zero upwards, where zero means no pollution and 100 or more means extremely high pollution. The AQI is not the average of the readings, it is the maximum of the readings. If all pollutants except for ozone are zero, and ozone is at 30, then the AQI is set at 30.

That means the AQI is always associated with one specific contaminant. If ozone drops to a reading of 10, but fine particles go up to 30, the AQI would remain at 30, and it would be attributed to fine particles.

If the AQI is expected to go above 50 within the coming three days, a "smog watch" is issued, and if it is expected to go above 50 within 24 hours, a "smog advisory" is issued.

Note that there are two very different types of pollutants in the AQI. Carbon monoxide, sulphur dioxide and nitrogen dioxide are locally emitted pollutants. To reduce levels in the air, we can reduce local emissions. By contrast, ozone and most types of fine particulates are not emitted -- they form in the air as a result of complex chemical reactions involving so-called "precursor compounds" under specific meteorological conditions. The precursor compounds include emitted gases, like NO2. However, they also include naturally occurring and anthropogenic volatile organic compounds, hydroxyl radicals and other chemicals. Ozone cooks up under intense ultraviolet radiation. Fine particles, especially aerosols, form under even more complex conditions. Both travel long distances, so the precursor emissions are often somewhere in the U.S. Midwest, not in Southern Ontario.

To reduce local ozone and fine particle levels, we would have to reduce precursor emissions in faraway locations that depend on current and ever-changing weather patterns; and even if we know where to go, it is not obvious what needs to be reduced when we get there. At one point, scientists thought that reducing nitrogen oxides (NOx) and volatile organic compounds (VOCs) would suffice. It is now known that things are not so simple. They have to be reduced in just the right ratios, under just the right conditions. Get the recipe wrong and you could end up with even more ozone.

One atmospheric scientist explained it to me in a recent e-mail as follows: "A decline in NOx can be a bad thing for O3 [ozone] if your VOC/NOx ratio is [less than eight to one]. It could drive you up on to the ridge of O3 production. Also you need to know if NOx is being decreased. The consumption of O3 may go down [i.e. ozone may go up], especially in urban areas where NOx titration of O3 is an important control mechanism."

The production of aerosols is no less complex.

So the situation is that the AQI components we can control have been reduced to the point where, today, they never trigger a smog advisory. All the smog warnings we get are triggered by ozone and fine particles -- the components we have little, if any, control over.

Making things more confusing, prior to August, 2002, the AQI system did not include fine particles, which is a very broad class of pollutant types. After the revision it became easier for the AQI to go above 30 in the fall and winter because of the range of compounds involved and the fact that they travel such long

distances. The first-ever winter smog advisory, in February 2005, was triggered by fine particles. But that doesn't mean we didn't have elevated fine particulates in the winter before then, it just means they weren't monitored or included in the index.

The AQI creates two false impressions. The first is that air pollution is going up. The second is that government needs to "do something." The reality is that the air pollutants we can control have been reduced to the point where they no longer give rise to smog warnings. Smog is now associated with the types of air contaminants over which we have little or no local control.

The journalist I mentioned is not the only one fooled by the AQI. The federal government itself is proposing onerous new emission-reduction requirements for sulphur and nitrogen oxides (over and above those already prescribed in provincial law) in response to what it perceives as a growing smog problem. Compliance with these regulations will be costly for both private industry and taxpayers. And it can be safely guaranteed that they will not reduce the number of smog alerts in Ontario, since they are caused by pollutants that mostly come from far away and develop through an inscrutably complex process.

The problems of the AQI may get even worse if the system is augmented with recently proposed "health-risk indicators." Now instead of merely getting a smog warning, the government will issue estimates of the death and disease rates associated with the day's air quality. Just wait for the public panic when radios announce: Sunny and clear today, a high of 29, UV 7.5 or high, and we're expecting 108 deaths from smog in the GTA today, including 27 children.

Then again, knowing the inverse relationship between the AQI and actual local air pollution emissions, a rising smog death count might actually mean things are getting better.

--- - Ross McKitrick is an economist at the University of Guelph.

CLOSE WINDOW