# CAC_Logo_CMYK.jpgClean Air Council Air Quality Monitoring Meeting Notes June 22nd 2018

# Meeting Proceedings Links

* Gabriella Kalapos, CAP: Air Quality Monitoring Roundtable and Next Steps ([pdf presentation here](http://cleanairpartnership.org/cac/wp-content/uploads/2018/06/Air-Quality-Monitoring-RT-and-Next-Steps.pdf)).
* Kaitin Carroll, TAF: Energy efficiency impacts on indoor environmental air quality – multi-residential case studies ([pdf presentation here](http://cleanairpartnership.org/cac/wp-content/uploads/2018/06/22.06.18-CAP-Clean-Air-Council-Air-Quality-Monitoring.pdf)).
* Greg Evans, SOCCAR: Air quality monitoring update and upcoming plans ([pdf presentation here](http://cleanairpartnership.org/cac/wp-content/uploads/2018/06/Clean-Air-Workshop-June-2018.pdf)).
* Christopher Morgan, City of Toronto: Toronto neighbourhood air quality monitoring studies and upcoming plans ([pdf presentation here](http://cleanairpartnership.org/cac/wp-content/uploads/2018/06/Toronto-Neighbourhood-Air-Quality-Studies-iv.pdf)).

**Presentations**

1. **Gabriella Kalapos, Clean Air Partnership: Summary of Air Quality Monitoring Rountable Direction**

* The current state of air quality monitoring: Province of Ontario = About 40 air quality monitoring sites across Ontario. GTHA = 14 air quality monitoring sites (plus a few mobile monitoring stations).
* Within the GTHA, there are a number of air quality activities such as shorter-term studies, neighbourhood studies, Halton Region air quality monitoring, the Hamilton air quality monitoring network as well as air quality modelling and air quality monitoring to verify models.
* This network has created a good sense of ambient air quality for the region but there is a need to increase understanding of the variability in air quality within the community.
* There has been innovation in air quality monitoring technology that has increased the amount and availability of data for example via real-time monitors (e.g. wireless sensor networks and wearable monitors). However, real-time air quality monitoring equipment suffers from a number of issues such as:
* There is no standard protocol for data collection and evaluation.
* Prices and quality of readings varies significantly
* These innovations could add significant value by supplementing data from stationary monitoring stations, specific source monitoring, informing debate, citizen science and/or personal use only. Feedback from the roundtable includes:
* Real-time monitoring should accompanied by precise source attribution to better understand cause and effect and to create change.
* Real-time monitoring can help us understand impacts of site specific land use and/or transportation decisions.
* The pursuit of perfect data may impede action.
* Action is generally deficient due to air quality’s low political profile (invisibility).
* Collaboration between relevant stakeholders is key to achieving progress.

**Future needs**

* Understand the variation in air quality within urban areas.
* Increase awareness and engagement among the public and key target audiences.
* Evaluate the effectiveness of smaller scale interventions on improving air quality.
* Gather information on present and future air monitoring actions being undertaken.
* Solicit interest in continuing the collaboration and format it should take.
* *Would like to gather feedback on: What are CAC members’ opinions on advancing work to devise an air quality monitoring/modelling framework/methodology that would enable various stakeholders to measure and compare the results of air quality monitoring interventions in a consistent way?*

1. **Kaitlin Carroll, The Atmospheric Fund: Energy Efficiency Impacts on Indoor Air Quality: Multi-Residential Case Studies**

* Approximately 87% of people’s time is spent indoors however the vast majority of research funds are directed towards understanding and improving outdoor air quality.
* 7 post-war multi-unit residential buildings (MURBs) from across 3 sites in Toronto were targeted by Toronto Community Housing Board for a range of retrofits. TAF used this intervention for their own study. Residents voluntarily submitted an application to be included in the study that covered different types of residential units (bachelor to 2 bedroom apartments).
* 5-15% of units per building were monitored over 3 years.Early 2015: Pre-retrofit surveys, asking residents’ perceptions of their spaces and their concerns, was performed. IEQ monitoring equipment was installed in volunteer’s suites shortly after. March 2016: Retrofit measures such as including boiler upgrades, MAU upgrades, and duct cleaning were completed. Individual smart thermostats were introduced to 2 of 3 sites. March 2018: Post-retrofit monitoring and resident surveys completed.
* Pre-retrofit monitoring: Monitoring equipment and resident surveys found a number of sub-optimal trends in thermal comfort and ventilation.
* Retrofits included: Condensing boiler retrofits or recommissioning; Gas absorption heat pumps (GAHPs); Duct cleaning; AHU replacement; New make-up air units (MAUs); Individual smart thermostats
* Post-retrofit monitoring results: Monitoring equipment suggested a number of beneficial outcomes such as:2-3˚C reduction in indoor temperatures; 22-30% reduction in the incidence of indoor temperatures exceeding 28˚C; Time spent above 950ppm CO2 threshold[[1]](#footnote-1) in spring and summer decreased at the majority of sites.
* Resident surveys also suggested a number of self-reported health benefits (e.g. less absenteeism from work or school, 37% decrease in hospital visits at 2of 3 sites).
* Insights: Reduce wintertime overheating, especially during shoulder season, and ensure mechanical equipment is properly sized. This is beneficial for indoor environmental quality. Summertime overheating can be addressed using active and passive strategies. Cleaning supply and return ducts regularly can improve ventilation. MAU tempering for both comfort and energy efficiency.
* As part of an Integrated Design Process, these measures can be effective at improving indoor environmental air quality.

Question: Where building envelope retrofits considered as part of the study?

Answer: These were not considered due to budget restrictions. This study aimed to target the “lower-hanging fruit” retrofits.

Question: How were suite characteristics screened for?

Answer: Suites were selected for a range of orientations, sizes, number of occupants and so on.

1. **Greg Evans, SOCCAR Air Monitoring Update and Upcoming Plans**

* Update on King Street Pilot: Preliminary findings suggest a 35% reduction in black carbon pollution from early November (before pilot) versus late November (during pilot) compared to College Street.

Question: Why was College Street chosen as the comparison site?

Answer: This reflected the existing knowledge of College Street’s air quality regime and that monitoring equipment was already in place.

* Update on traffic pollution research: The traffic mix (i.e. the mix of cars, trucks etc.) as well as total traffic count is an important determinant of air quality. The percentage of trucks in the traffic mix can disproportionately increase air pollutant concentrations.
* Comparisons were made between air quality monitoring at 3 locations: College Street (Toronto), Clark Street (Vancouver) and the 401 highway (Kipling area).
* Question: Has the vertical distribution of air pollution been looked at?
* Answer: preliminary findings are suggesting that there tends to be a drop off faster vertically than horizontally, but there is definitely the need for more research in this area.
* Non-tailpipe emissions also greatly affects air quality however it has received less attention compared to tailpipe emissions. This insight can be used to maintain the political importance of air quality issues in the face of electric vehicle roll outs.
* Non-tailpipe vehicular emissions arise from vehicle tires and brakes that can release heavy metal pollutants as well as kick up road dust into the air. Preliminary findings suggest that road dust becomes a significant contributor to PM2.5 concentrations at rush hour.
* Update on Smart Highways Project: working to expand highway CO2 monitors as a means to isolate and identify the contribution of road traffic to overall air quality. This may then allow for estimates of most traffic pollutants (using vehicle emission factors).

**Future Plans**

* Oshawa Smart City Project: Deploy 5 airSENCE devices for 8 months in the downtown as well as ROVER in-road monitors. Establish baselines and link to City’s Teaching City initiative and make data available and providing instructional elements.
* Mississauga Smart City Project: Deploy 45 airSENCE devices. Integrate this with the existing city information infrastructure. Partner with OCE project to explore air quality at school drop-off zones.
* Christopher Morgan, Toronto Neighbourhood Air Quality Studies and Upcoming Monitoring Plans

1. **Christopher Morgan, Environment and Energy Division, City of Toronto, Toronto neighbourhood air quality monitoring studies and upcoming plans**

* Air quality modelling and monitoring can be used to inform each other and augment the understanding of local and regional air quality. Individually however, they contain different strengths and weaknesses making it hard to rely on a single solution to inform air quality status.
* The City of Toronto undertook a number of initial studies using the CALPUFF model to capture early insights on air quality modelling. Initial studies looked at Riverdale Leslieville and South Etobicoke. However, a number technical issues with the model led to political resistance and problems for more ambitious city-wide studies.
* Since this time, Region of Peel and Hamilton, using the CMAQ model, have had much better success by using it over the whole GTHA, at high spatial resolution and over a 10-year time period to better understand the local and regional air quality regime.
* A new generation of air quality models offer improved understanding. Previous monitoring efforts focused on the “Big Six” industrial pollutants using 4 monitoring stations across the City of Toronto. This met provincial air quality monitoring standards.
* Now, monitoring efforts within the City are taking a less industrial focus with more of a view to monitor air quality in close proximity to people. Working to get 2 new MOE monitoring stations in place (next to the 401 highway and at University/Front Street intersection).
* City of Toronto Environment and Energy Division and Toronto Public Health are also in partnership exploring traffic-related air pollution (TRAP); especially in relation to day cares, schools and senior LTC homes.
* A pilot study on using the concepts and practices of monitoring TRAP was conducted at 15 schools in 2017. Pollution scores have been attributed to reflect each school’s proximity to highways and parkways.

**Upcoming needs**

* Better regional understandings of air quality by combining and integrating new regional air quality models with new regional monitoring capabilities.
* Better local details on air quality variation
* Better locally-specific understandings by integrating local air quality models that represent traffic volume and flow, urban form and so on.
* More spatially detailed approach to air quality
* Better monitor/model air quality changes due to traffic flow, urban canyons, overlapping versus connected intersections, the near-side and far-side of intersections.

1. **Louise Aubin, Region of Peel Public Health Update**

* A policy in the Region of Peel’s OP relates to air quality monitoring. The Region of Peel has secured 5 years’ worth of funding to use the CEMAC model (1km2 resolution) to capture air quality in the region and inform transportation planning in the face of the Region’s very high traffic flows and projected population increases. This work can also inform the Region’s active transportation planning.

Question: Were the air quality policies represented by the PHU or Planning Department?

Answer: PHU and Planning are in a collaborative partnership and used a discussion paper on air quality to increase the issue’s profile and engage in dialogue. A steering committee also guides the process.

Feedback on Possibility of an Air quality Intervention Monitoring Framework/Methodology

* Is it feasible to identify a framework for air quality monitoring interventions?
* It is recognized that there is likely to be increased availability of air quality data as new lower cost technologies come on the market, however their accuracy is likely to vary in the early stages.
* There is a need to contextualise air quality data and information for members of the public to increase its relevance.
* Risk communication needs to be done very carefully given that not all air quality issues are known or solvable through the solutions available to municipalities.
* There is a need to standardize and verify data from air quality monitors in order to ensure evidence based decision making.
* Setbacks can occur with municipal land use policies that are in conflict with air quality measures (e.g. lack of urban forestry, persistence of urban canyons).
* There exists a very diverse portfolio of possible air quality interventions making a standardized framework problematic.
* CAC members voiced more immediate needs such as:
* The role of PHUs and academics to conduct research to explore implementable solutions to air quality issues.
* An identification of “low hanging fruit” that can be targeted to mitigate air quality (e.g. new urban building design features, placement of air intakes, vehicle design features and so on).
* A portfolio of available air quality interventions was identified including:
* Targeting schools and day care centres (and their parent councils)
* New building modifications
* Partnership development between planning departments and PHUs
* Creating air quality monitoring zones
* Pushing for legislation and bylaws to enable mandates to act on air quality at the municipal level.
* Developing new and/or identifying existing decision-support tools to help prioritize action

1. ASHRAE suggests 950ppm is the concentration threshold above which CO2 can cause lethargy and diminished cognitive abilities. [↑](#footnote-ref-1)