**Supplemental for:**

**High-resolution quantification of atmospheric CO₂ mixing ratios in Greater Toronto Area, Canada**

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## Table S1: Facility-specific $CO_2$:CO for the Point sector

| Name | $CO_2$ (kt) | CO (kt) | $CO_2$:CO (kt $CO_2$/kt CO) |
|---|---|---|---|
| Brighton Beach | 233.3 | 0.28 | 842 |
| Bruce Power | 69.0 | 0.03 | 2091 |
| Cardinal Power | 562.1 | 0.06 | 9527 |
| Cochrane Generating Station | 1113.3 | 0.34 | 3323 |
| East Windsor Cogeneration Center | 124.3 | 0.05 | 2345 |
| Essar Power Canada ltd. | 1502.4 | 0.48 | 3137 |
| Goreway Power Station | 1209.8 | 0.72 | 1680 |
| Greenfield Energy Center | 937.9 | 2.18 | 431 |
| Halton Hills Generating Station | 397.0 | 0.07 | 5839 |
| Iroquois Falls Generating Station | 321.0 | 0.07 | 4864 |
| Kapuskasing Power Plant | 136.6 | 0.03 | 4268 |
| Kingston Cogen | 332.0 | 0.05 | 6775 |
| Kirkland Lake Generating Station | 321.9 | 0.63 | 513 |
| Lake Superior Power | 203.1 | 0.06 | 3692 |
| Lambton Generating Station | 3289.9 | 1.41 | 2337 |
| Lennox Generating Station | 120.1 | 0.07 | 1819 |
| Mississauga Cogeneration Plant | 363.8 | 0.13 | 2756 |
| Nanticoke Generating Station | 8544.1 | 3.40 | 2513 |
| North Bay | 133.5 | 0.03 | 4170 |
| Ottawa Health Sciences Center Cogeneration Facility | 220.0 | 0.07 | 3013 |
| Plasco Trail Road | 3.2 | 0.02 | 154 |
| Portlands Energy Centre | 457.3 | 0.34 | 1333 |
| Sarnia Cogen Plant | 362.4 | 0.22 | 1618 |
| Sarnia Regional Cogeneration Facility | 1194.2 | 0.40 | 2971 |
| St. Clair Energy Center | 357.6 | 0.29 | 1216 |
| Thorold Cogen Generating Station | 305.5 | 0.20 | 1543 |
| Tunis Power Plant | 109.3 | 0.08 | 1401 |
| Whitby Cogeneration | 189.3 | 0.09 | 2175 |
| Windsor Essex Cogeneration Plant | 202.1 | 0.07 | 2846 |
| Haggersville Mine | 52.0 | 0.04 | 1406 |
| Beachville Operation | 487.6 | 0.24 | 2008 |
| Dundas Operation | 406.4 | 0.23 | 1744 |
| Northern Lime Limited | 90.8 | 0.09 | 1032 |
| Copper Cliff Nickel Refinery | 51.3 | 0.03 | 1654 |
| Copper Cliff Smelter | 201.1 | 0.10 | 1971 |
| Mississauga Lubricants Center - Petro-Canada | 365.04 | 0.08 | 4680 |
| Nanticoke Refinery - Imperial Oil | 1058.08 | 7.83 | 135 |
| Sarnia Manufacturing Center | 759.47 | 0.34 | 2234 |
| Sarnia Refinery- Suncor | 628.00 | 4.69 | 134 |

| | | | |
|---|---|---|---|
| Sarnia Refinery Plant  - Imperial Oil | 1270.44 | 2.43 | 523 |
| Dofasco Hamilton | 4939.9 | 9.23 | 535 |
| Essar Steel Algoma Inc. | 2219.1 | 0.90 | 2468 |
| Gerdau Whitby | 83.7 | 0.28 | 295 |
| Hamilton Works - U.S. Steel Canada | 2674.7 | 2.45 | 1093 |
| Ivaco Rolling Mills | 74.5 | 0.20 | 369 |
| Lake Erie Works - U.S. Steel Canada | 1387.6 | 1.49 | 931 |

**Table S2: Grouping of EDGAR v4.2 SNAP sectors to SOCE inventory sectors**

| SOCE Sector | EDGAR v4.2 SNAP Sectors |
|:---:|:---:|
| Area | 1A4 + (6A+6C) + 1A2 + 1A1a + 2C + 2A |
| Point | 1B2a + (4C+4D) + (2B+3) + 1A2 + 1A1a + 2C + 2A |
| Marine | 1A3d |
| On-road | 1A3b |
| Off-road | 1A3a + 1A3c + 1A3e + 1A3d |

| Downsview | □ |
| Hanlan's Point | △ |
| Egbert | ○ |
| Turkey Point | ◇ |
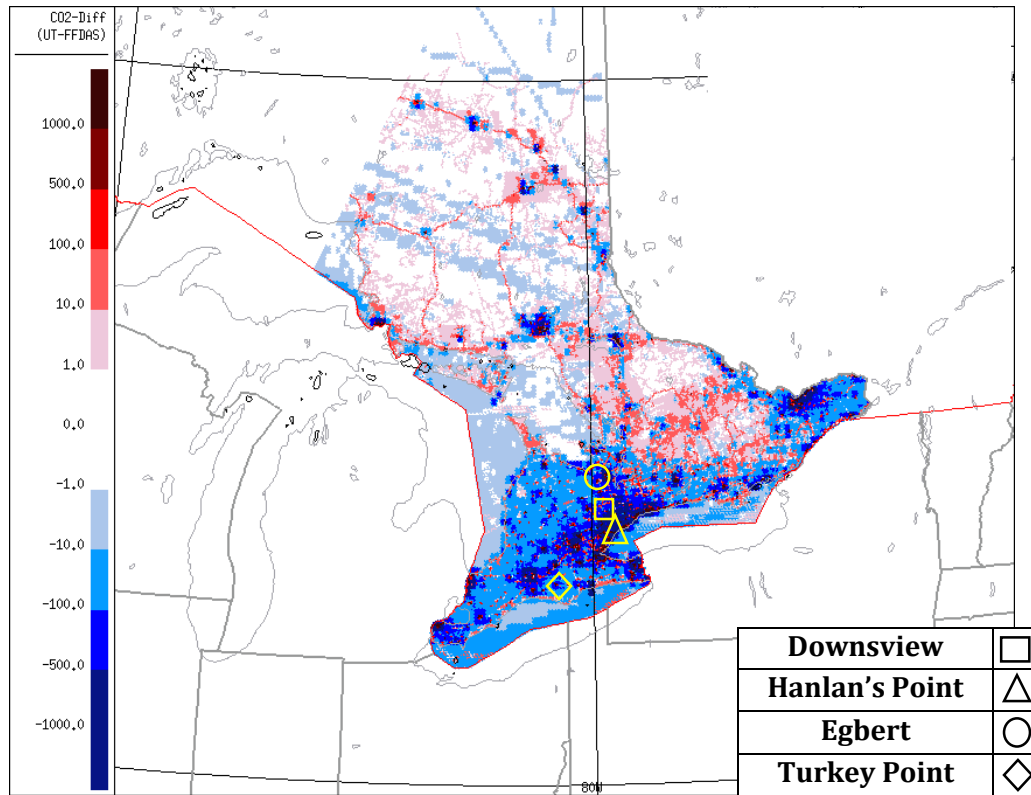
**Figure S1: Annual mean difference in anthropogenic $CO_2$ emissions (units: g $CO_2$/second/grid cell) between the SOCE and the FFDAS v2 inventories (SOCE – FFDAS v2) for a weekday in February 2010. Locations of in-situ measurements of $CO_2$ are shown**
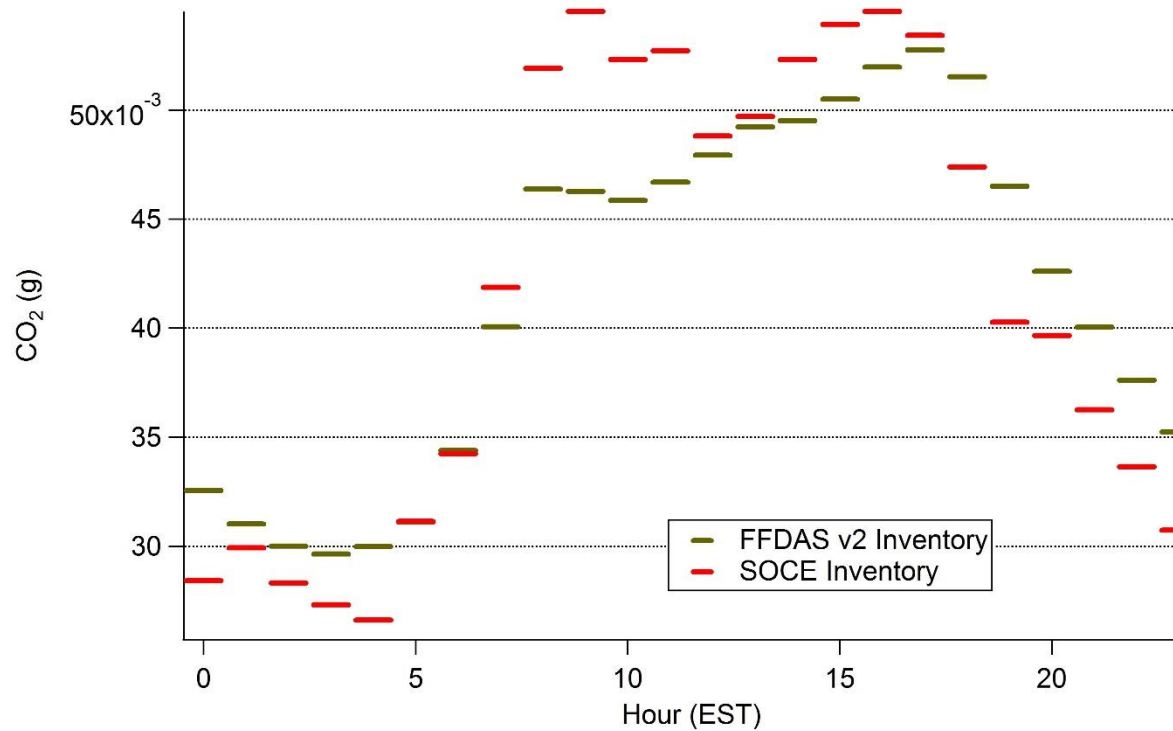
**Figure S2: Diurnal profile of $CO_2$ emissions (grams) estimated by the FFDAS v2 and SOCE inventories for January-March for the black-box domain in Figure 2a.**
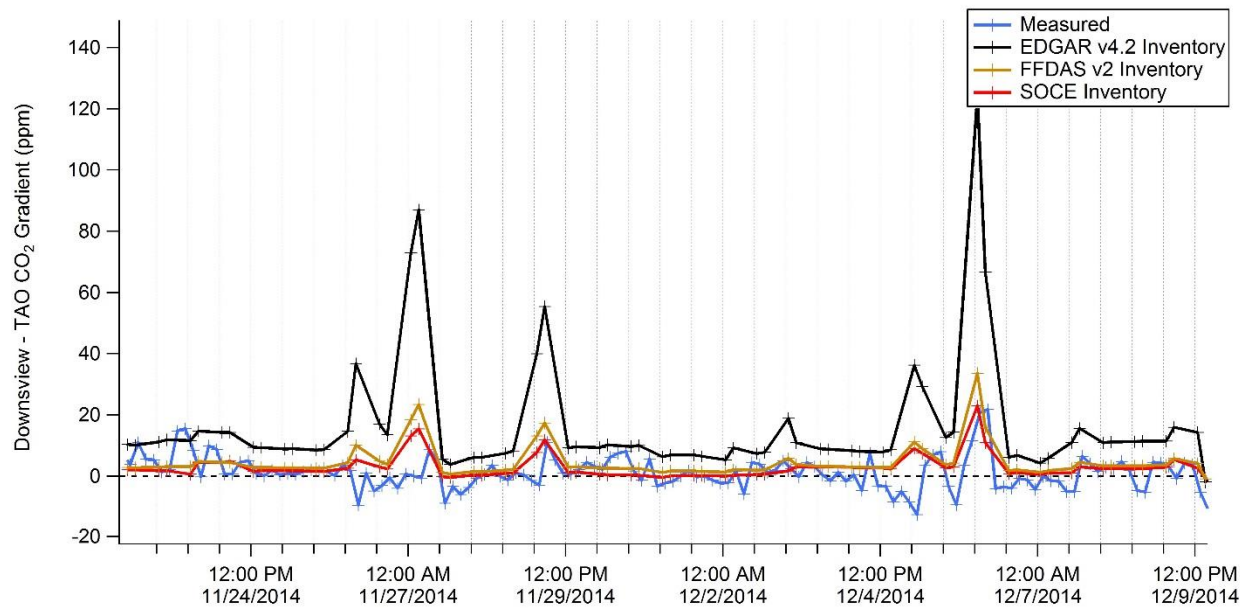
**Figure S3: Time series of measured (blue) and modelled Downsview – TAO gradient $CO_2$ mixing ratios. The black, red and gold lines are the modelled mixing ratios when using the EDGAR v4.2, FFDAS v2 and SOCE $CO_2$ inventories, respectively.**
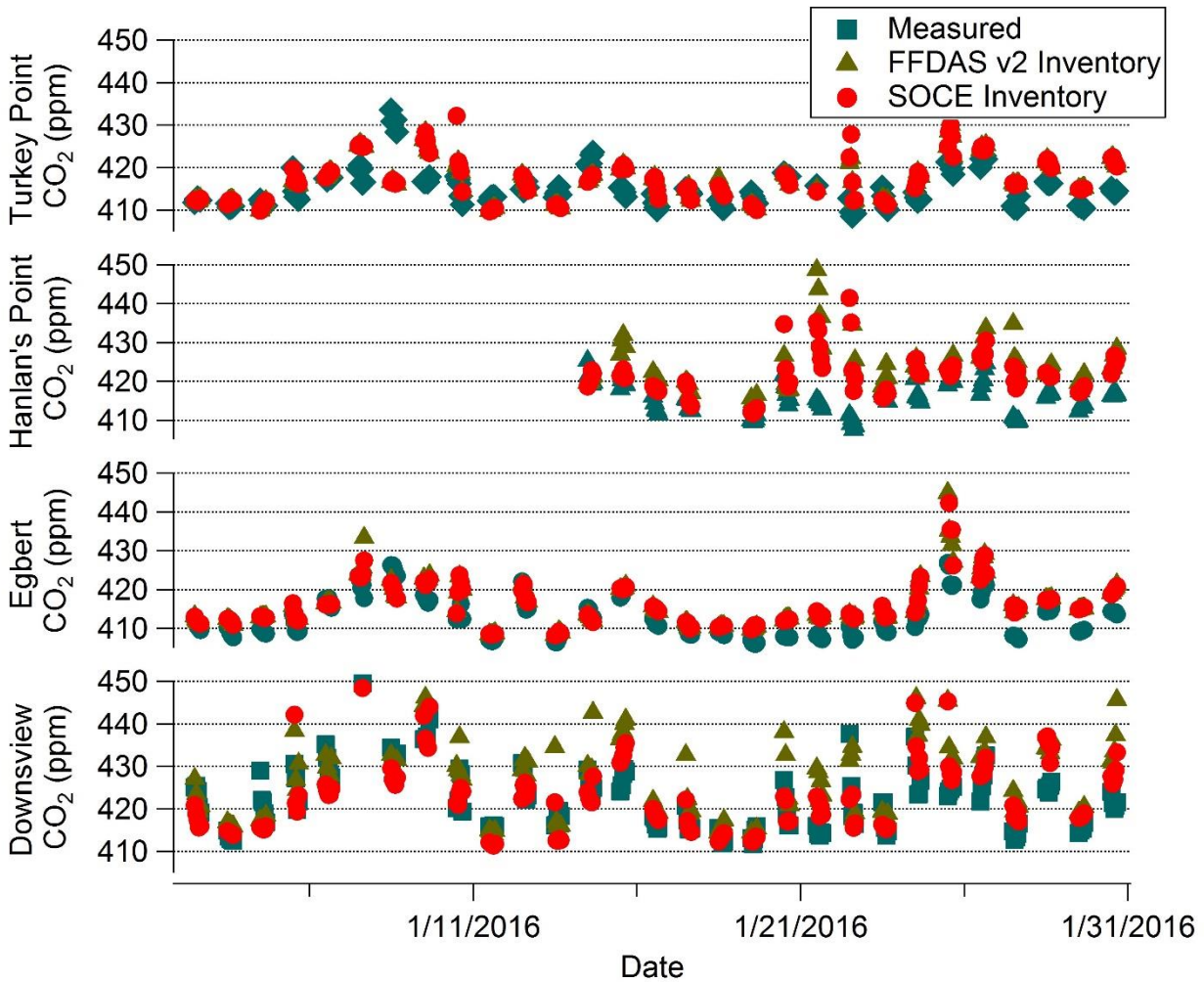
**Figure S4: Time series of measured (blue) and modelled January afternoon (12:00-16:00 EST) CO₂ mixing ratios for the four sites used in this study. The red and gold markers are the modelled mixing ratios when using the SOCE CO₂ inventory and the FFDAS v2 inventory, respectively.**
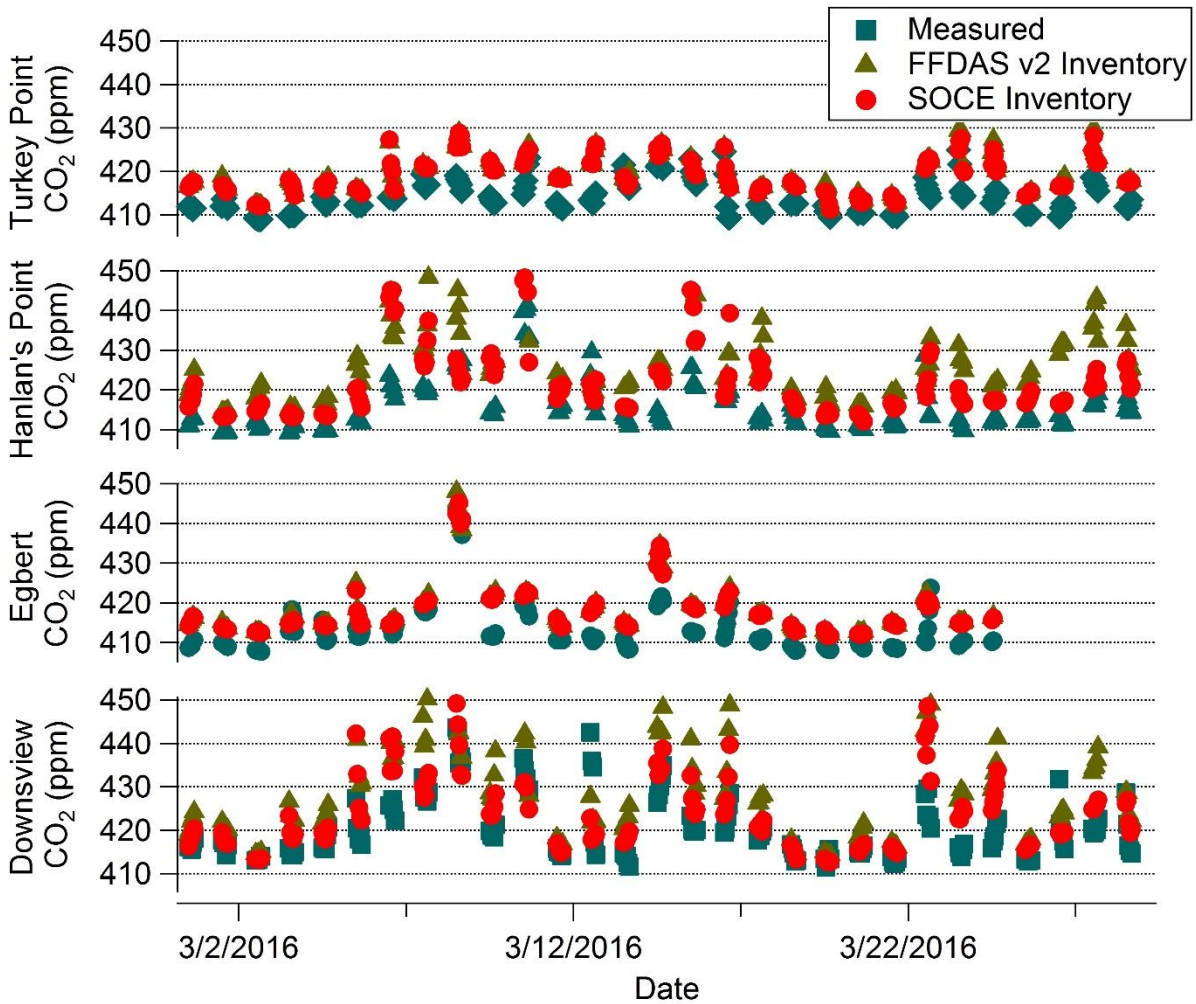
**Figure S5: Time series of measured (blue) and modelled March afternoon (12:00-16:00 EST) $CO_2$ mixing ratios for the four sites used in this study. The red and gold markers are the modelled mixing ratios when using the SOCE $CO_2$ inventory and the FFDAS v2 inventory, respectively.**
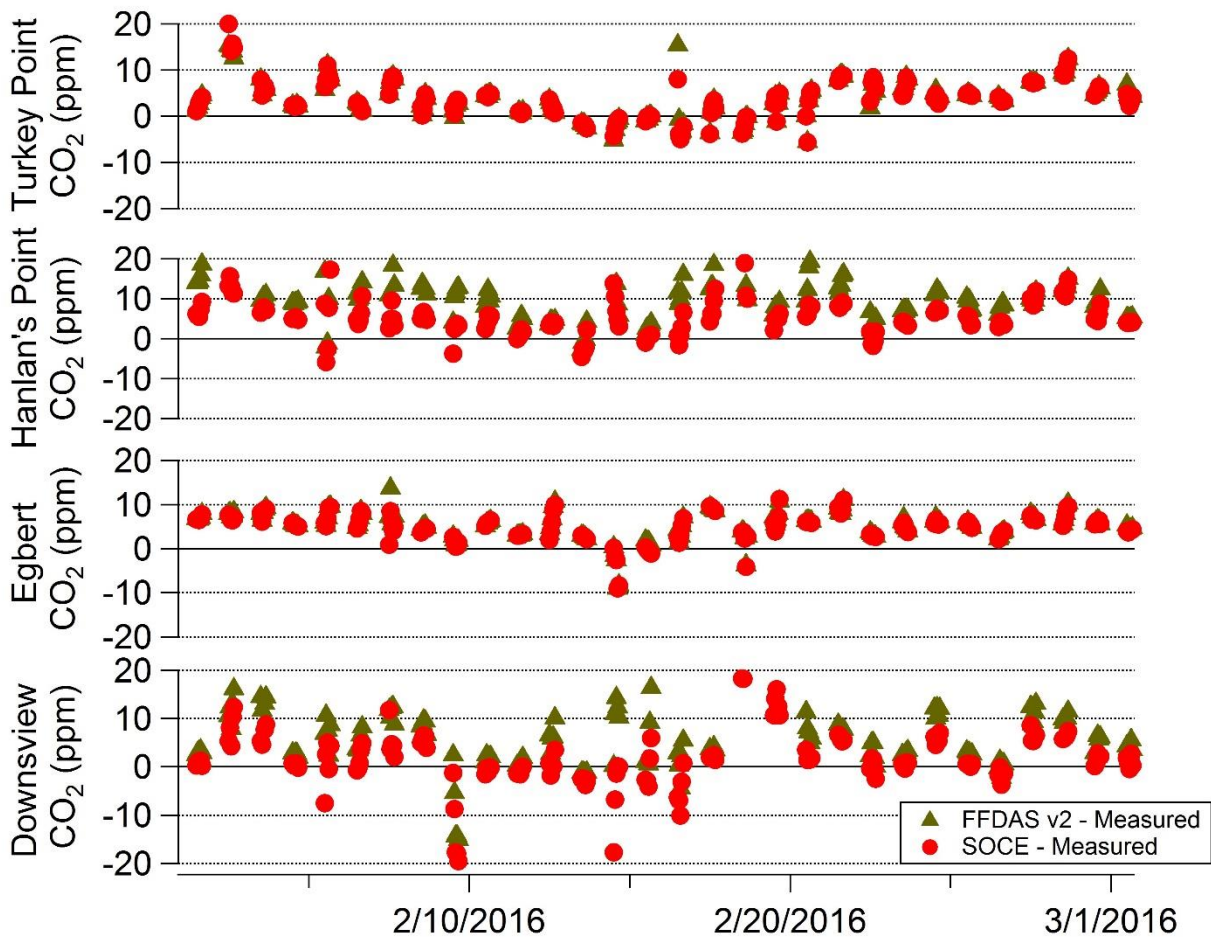
**Figure S6: Time series of the difference between modelled and measured CO$_2$ mixing ratios in February (12:00-16:00 EST) for the four sites used in this study. The red and gold markers are the differences when using the SOCE CO$_2$ inventory and the FFDAS v2 inventory, respectively.**
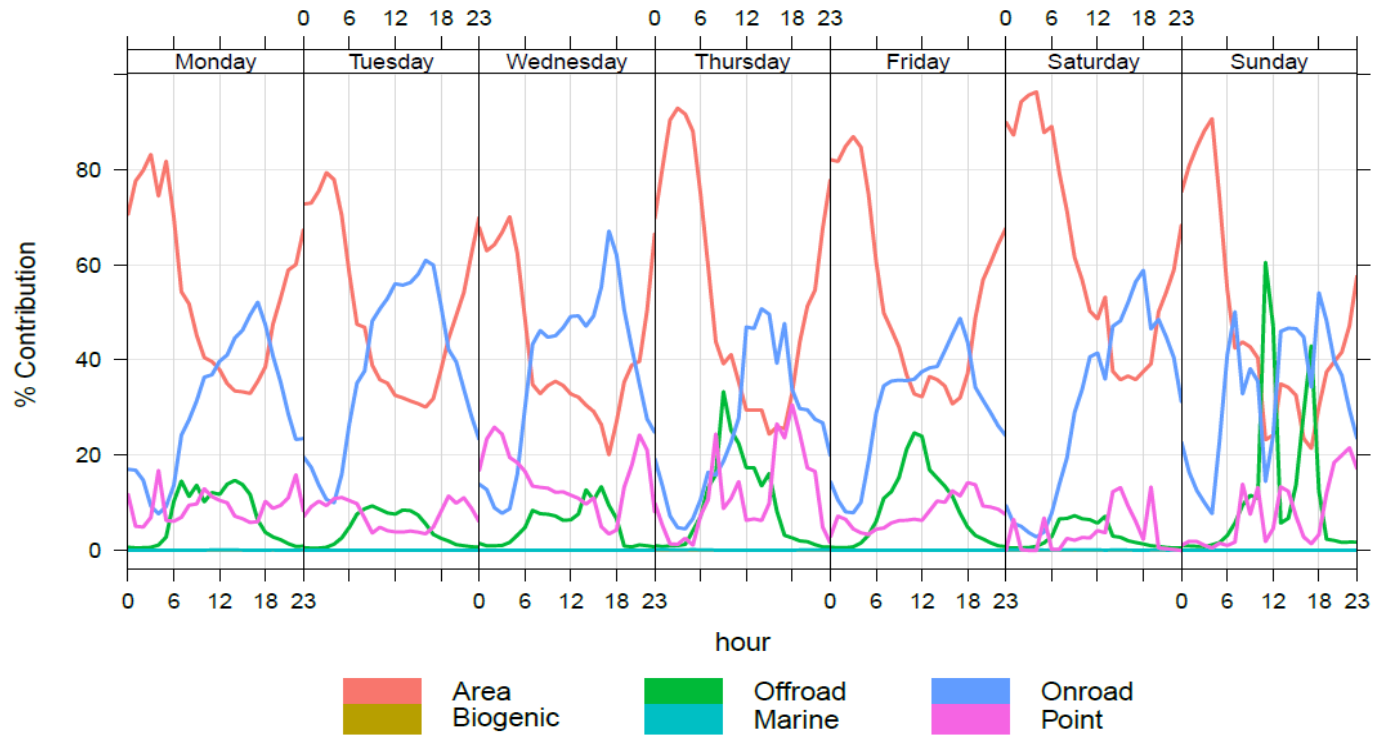
**Figure S7: Modelled sectoral percent contributions to diurnal local $CO_2$ enhancement for January 2016 at Downsview averaged by day of week. Note: Area = Area + Residential natural gas combustion + Commercial natural gas combustion. (Time zone is EST).**
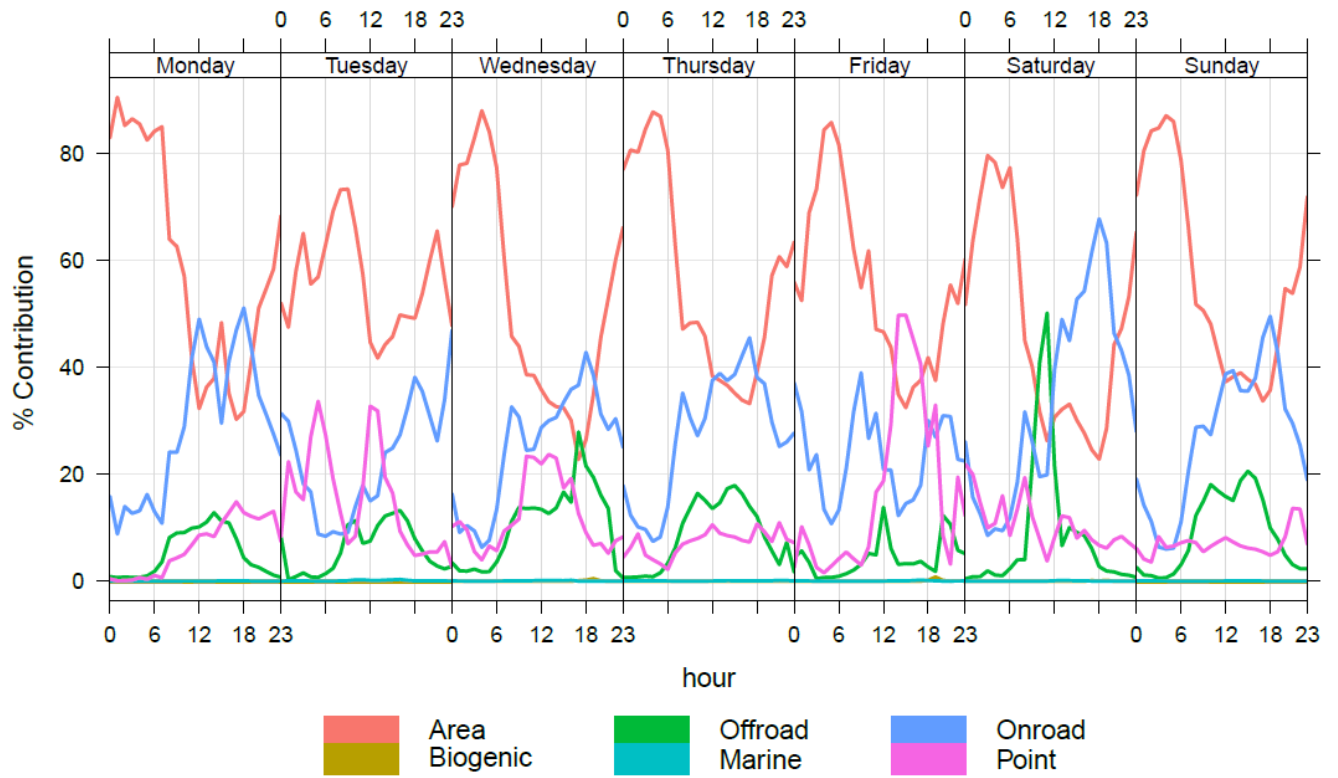
**Figure S8: Modelled sectoral percent contributions to diurnal local $CO_2$ enhancement for March 2016 at Downsview averaged by day of week. Note: Area = Area + Residential natural gas combustion + Commercial natural gas combustion. (Time zone is EST).**