



# Assessment of the glo Tobacco Heating Product (Part 1): Aerosol composition and environmental emissions



Novel products such as e-cigarettes, and more recently tobacco-heating products (THPs), which heat and do not burn tobacco, significantly reduce levels of combustion-derived toxicants in their aerosol emissions compared with cigarette smoke, and therefore have the potential to reduce harm to both users and bystanders.

Here, the emissions of a THP (glo) are compared to a commercial cigarette, evaluating toxicant levels and aerosol impact on indoor air quality (IAQ). glo heats the tobacco to a temperature of  $240^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , rather than combusting the tobacco as in a conventional cigarette. Although the device does continue to heat the tobacco during the inter-puff period, there is not enough gas expansion for any emissions to escape the enclosure, so does not produce any so-called 'sidestream emissions'.



## EMISSIONS

THP emissions were assessed using targeted chemical analysis across several public health toxicant lists including the WHO's TobReg9 priority toxicants and the US FDA's Harmful and Potential Harmful Constituents (HPHCs). The samples were smoked using the Health Canada Intense (HCI) smoking regime

Overall, the emissions data show

that the mechanism of heating tobacco produces significantly lower levels of HPHCs than are present in mainstream tobacco smoke.

Of the 126 compounds tested; 113 were below the Limit of Detection (LoD) or below background levels. The remaining 13 compounds were >90% reduced compared to cigarettes.

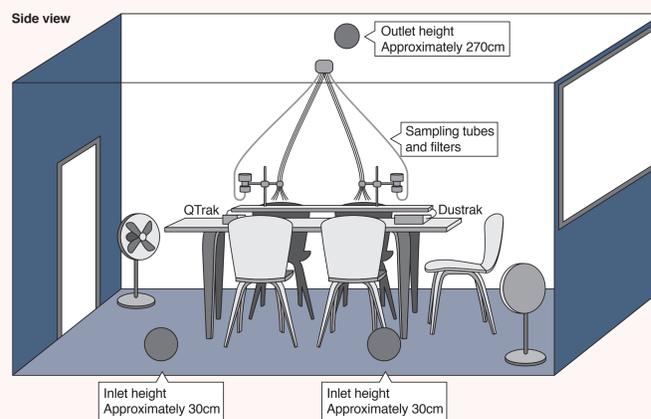
## TOXICANTS OF INTEREST Cigarette v glo



## INDOOR AIR QUALITY

### METHODS

- » 4 volunteers, 4 hour exposures in a  $37.8\text{m}^3$  room @ 1.2, 2.2 & 7.7 ACH to represent home, office and hospitality environments (BS EN 1521)
- » Morning control, afternoon test
- » 20 sticks (home)/32 sticks (office, hospitality)
- » Central sampling bar



### METHODS (SPECIES).

- » Aerosol mass, number, diameter: Cambustion DMS-500
- » Chemical measurements
  - VOCs: Tenax TA, TD-GC-MS
  - Carbonyls: Waters 2,4, DNPH cartridge, HPLC
  - 4 TSNA: bisulphate filter, HPLC-MS
  - 16 USEPA PAH: XAD-2, GC-MS
  - Nicotine, 3-EP, Glycerol: XAD-4, XAD-7, GC-MS
  - CO, CO<sub>2</sub>: TSI 7575 Q-Trak
  - NO, NO<sub>2</sub>: Thermo Environmental Systems 42 C

**RESULTS.** The glo THP does not produce sidestream emissions between puffs and only heats the tobacco to  $240^{\circ}\text{C} \pm 5^{\circ}\text{C}$  during puffs. As a result, the impact on IAQ is significantly

lower than for a combustible cigarette, driven by significantly lower emissions of both aerosol particles and chemical emissions. In this study most test analytes were below detectable levels,

though those that were detectable – nicotine, acetaldehyde and formaldehyde – the levels were >90% lower than those from cigarette smoke.

The mainstream emissions data for glo show that compared to a combustible cigarette the toxicant levels are either below the limit of detection, or significantly reduced across 126 measured compounds.

The glo THP device shows a significantly lower impact on IAQ as compared with a combustible cigarette. These data show that the novel THP has the potential for reduced health and environmental impact compared to cigarette smoke for users and bystanders. Further pre-clinical and clinical assessments are required to understand further the risk reduction potential of these novel products at individual and population levels.

Forster M *et al.* (2018). *Regul Toxicol Pharm* **93**: 14–33

Forster M *et al.* (2018). *Regul Toxicol Pharm* **93**: 34–51

