Ricardo
Energy & Environment

UK Emission Projections for 2020

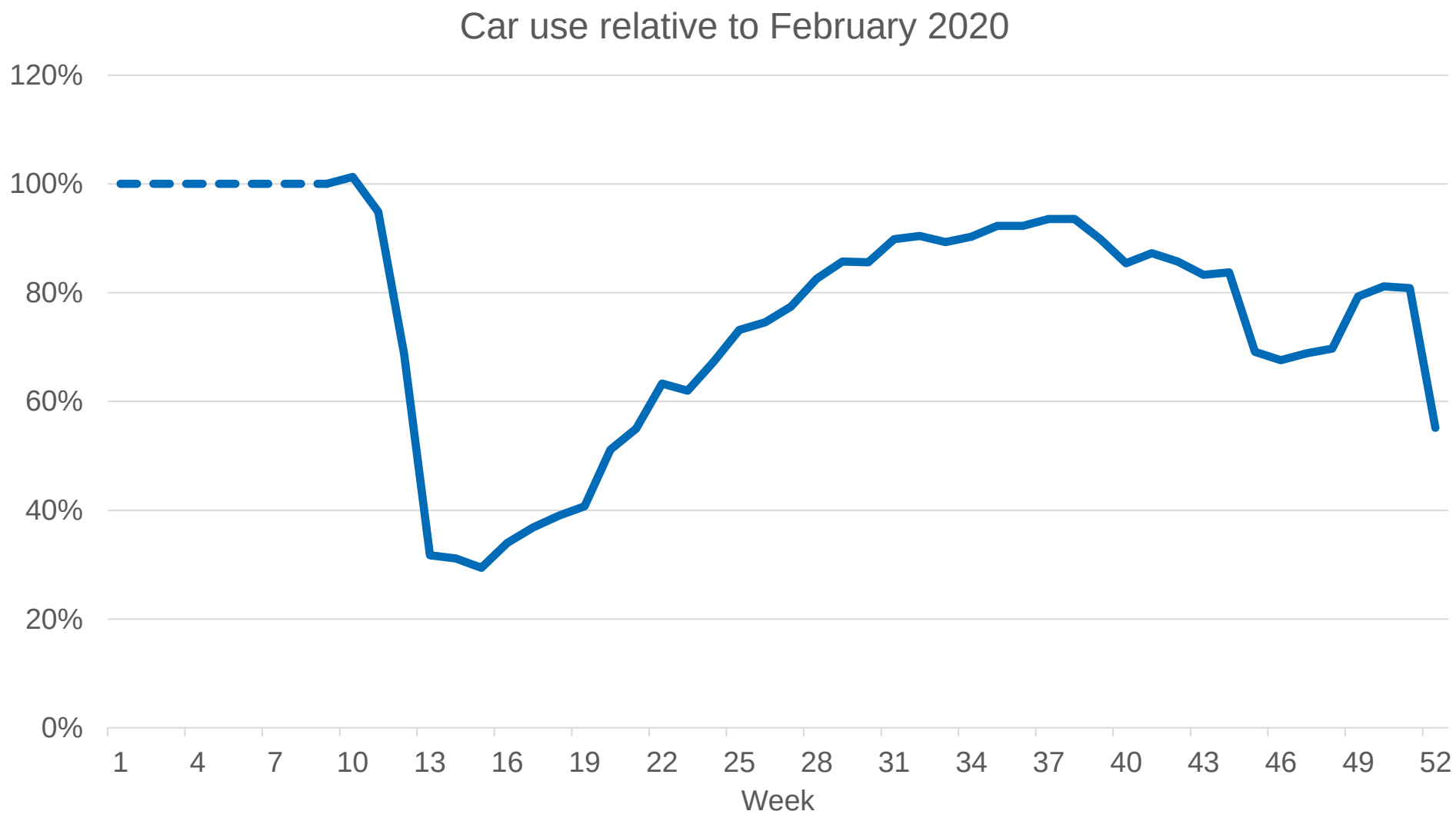
Prepared by Neil Passant, Eirini Karagianni, Anne Misra

6th May 2021

Covid-19: UK timeline (1)

Q1	First suspension of some flights (to China), further restrictions follow in March Govt advises against non-essential travel and urges work from home UK goes into first lockdown
Q2	Phased lifting of lockdown begins with return of some workers to workplaces e.g. construction Further important steps in easing of national lockdown Covid alert level lowered from level 4 to level 3
Q3	Further easing of lockdown restrictions in England but local lockdowns in areas with high case numbers Covid alert level raised from level 3 to level 4
Q4	Introduction of 3-tiered system: tighter restrictions again in some areas, with areas added over next weeks Into four-week lockdown 2 Lockdown replaced with 4-tiered system with most of England in T3/T4 until lockdown 3 on 4th Jan 2021

Covid-19: UK timeline (2)



Assumptions & input data: Transport

- Standard approach relies on road traffic forecasts, assumptions related to the mileage splits by fuel type for cars and LGVs (DfT, No account taken of Covid), and forecasts for future sales of new cars & LGVs (SMMT, includes impact of Covid). All of the latest data were provided in early 2021
- Impact of Covid assessed using DfT provisional vkm road traffic estimates for 2020 (Q1-Q3) and using daily transport mode usage data to estimate vkm for Q4 . These data were used to calculate the reduction in traffic between 2019 and 2020 which was then applied to the DfT road traffic forecast.
- Total aircraft movements data available for each month in 2020 by airport used to scale from more detailed 2019 movement data.
- Estimates for off-road vehicle emissions scaled from 2019 using 2020 passenger numbers (for airport vehicles) and construction output (for construction machinery).
- No 2020 activity data available yet for rail so impact of Covid on this sector could not be included. Rail passengers were much lower in 2020 but not clear if any significant reduction in number of trains running.
- Shipping – no modelling to take account of Covid

Assumptions & input data: Stationary Combustion

- Quarterly Energy Statistics
  - available for 2020 Q1-Q3
  - Relatively low level of detail (e.g. 1A2, not 1A2a, 1A2b etc.)
  - Don't cover all sectors and fuels (e.g. no data for 1A4bi biomass)
- Half-hourly data on electricity generation by fuel, through to 31st December 2020
  - Data available for coal, natural gas & biomass
- Emission factors adjusted to account for closure of two of UK's six coal-fired power stations in early 2020
- Data for Q2 and Q3 in 2019 and 2020 used as a measure of impact of Covid-19.
- 2020Q4 fuel use in 1A2/1A4 was estimated using data for 2019Q4 but assuming the same 'Covid' trend as in Q2/Q3
- For residential sector, UK temperature data indicated slightly fewer heating degree days in 2020 Q4 than in 2019 Q4 i.e. less need for heating. We therefore used 2019Q4 fuel data as a conservative starting point for our modelling.

Assumptions & input data: Processes and product use

- Govt statistics for part of 2020:
  - Mineral products (concrete, bricks, sand & gravel), Q1-3 or Jan-Nov
  - Indices of production for ~35 sub-divisions of industry, Jan-Oct
  - Consumer spending in 2020 Q1-Q3 by category including expenditure on:
    - Food (bread, meat, fish)
    - Alcoholic drinks
    - Tobacco
    - Materials for household maintenance and repair
    - Non-durable household products
    - Personal care products
    - Cleaning of clothing
    - Vehicle maintenance products
  - UK Govt provisional 2020 estimates for production of rapeseed
  - Trade body views on impact: mineral products; steel; chemicals; whisky; paper

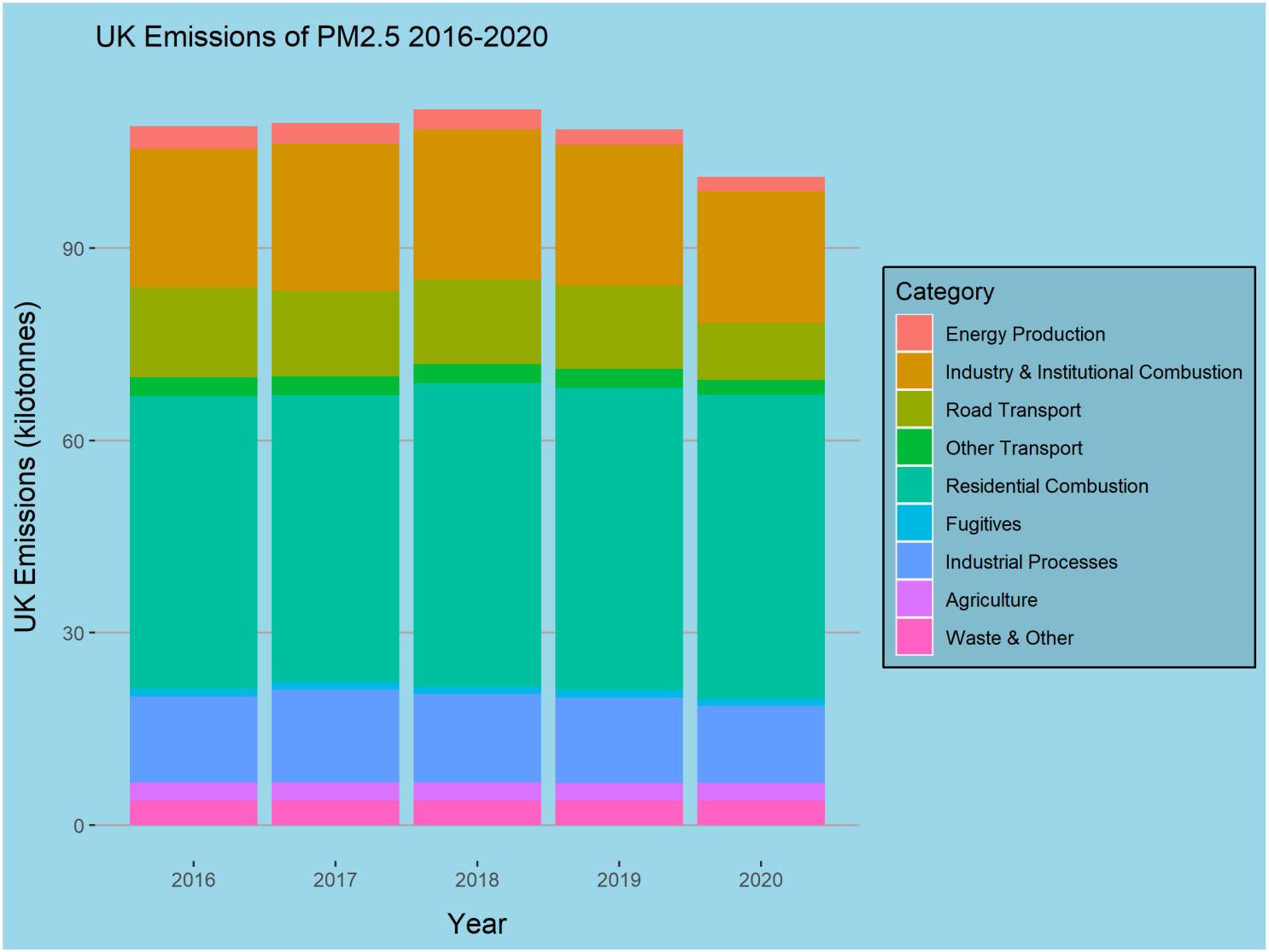
- In each case, part-year data extended to whole of 2020 by assuming reduction in Q4 compared with previous year was same as average reduction for Q2/Q3

Sanitizer Use

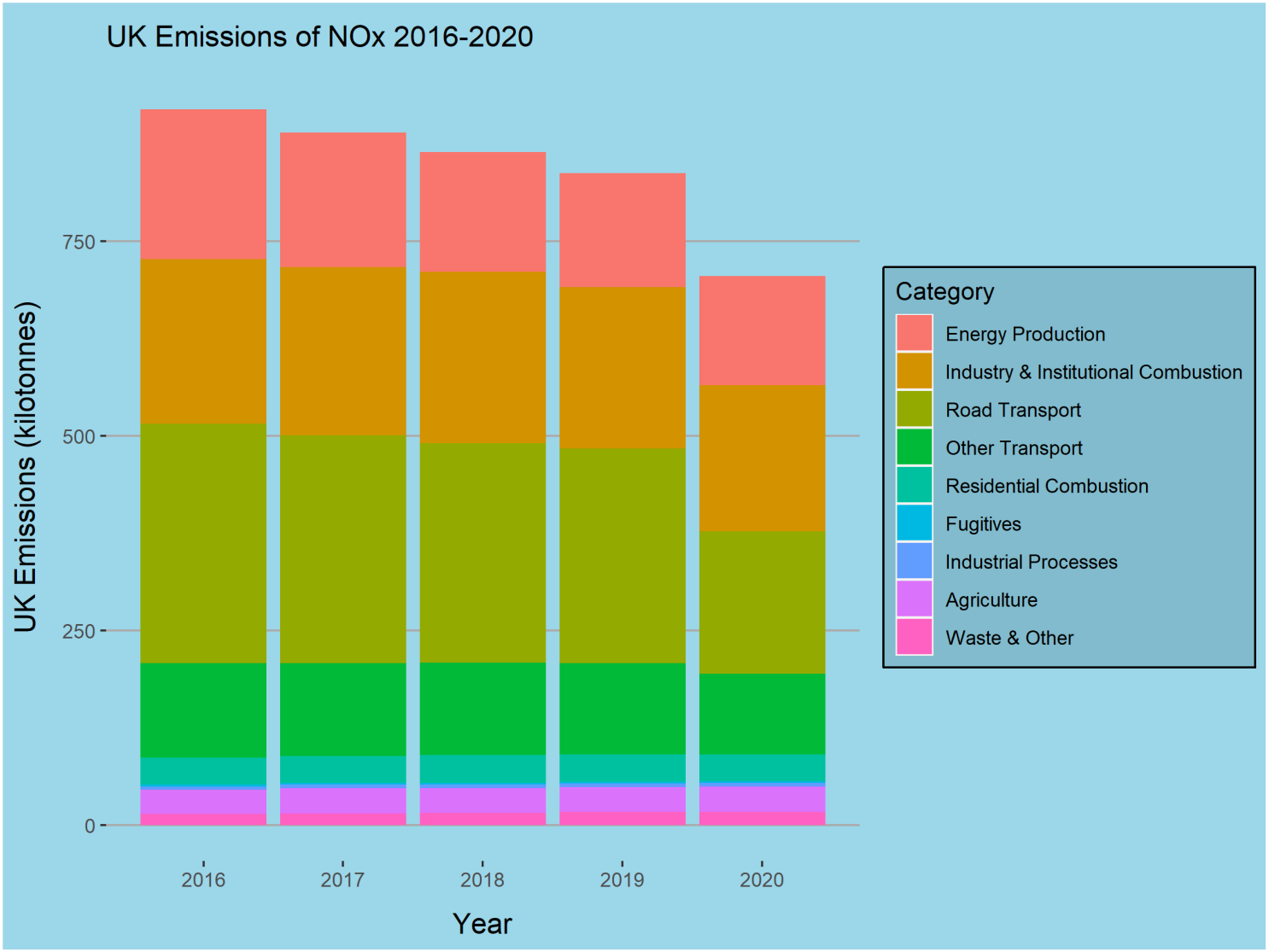
- Alcohol-based sanitizer not included in the 2019 UK inventory as a separate source but emissions possibly included in estimates for personal-care products
- Emissions assumed to be trivial before 2020
- Very little data yet on consumption or VOC emissions in 2020
- However, have estimates for sanitizer use in the public health service:
  - Volumes used in England & Scotland available for 2020
  - Numbers of units only for Wales/Northern Ireland, so volume estimated
  - Emissions based on assumption that 80% alcohol (so factor = 665 g VOC/litre)

- No emission estimates yet for:
  - Private health sector use
  - Industrial/commercial sector use
  - General public use

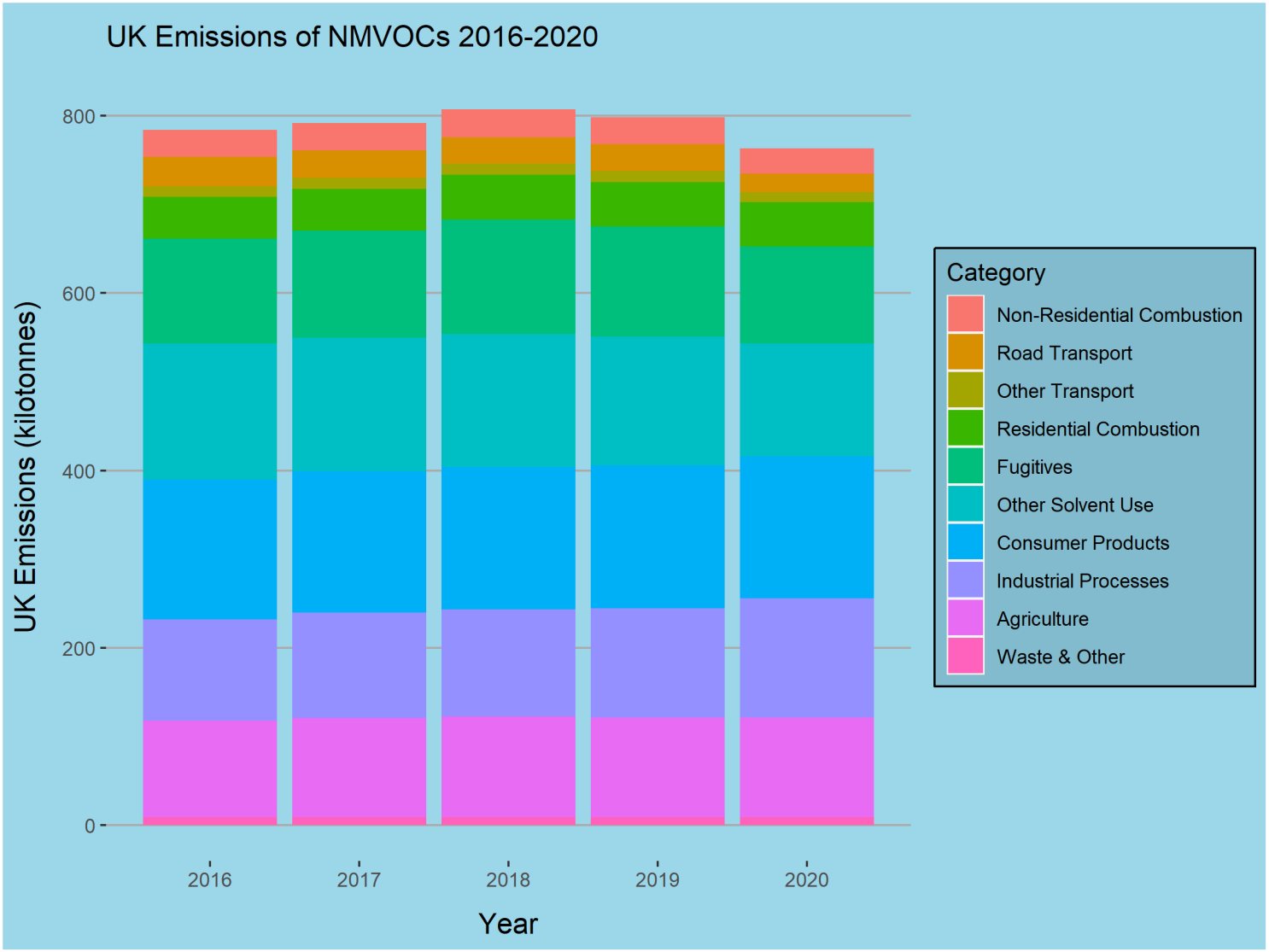
Historical & projected $PM_{2.5}$



Historical & projected NO_X



Historical & projected NMVOC



Summary

- 2020 emissions estimated, partly using historical activity data (for 2020 Q1-Q3 mainly), partly by projecting from 2019.
- Some of the historical activity data was high-level data such as indices of output, consumer spending trends etc.
- Uncertainty likely to be highest for NMVOC due to greater use of these data.
- Emissions of NO_X, $PM_{2.5}$ & NMVOC all lower in 2020 than 2019.
- NMVOC from public health sector use of hand sanitizer estimated, but no estimates yet for other use.
- Potential to continue to use the approach for short-term ‘projections’ (current year / previous year)

Neil Passant
Ricardo Energy & Environment
30 Eastbourne Terrace, 2nd Floor, W2 6LA London, UK

Neil.Passant@ricardo.com