

# Green NCAP

**Independent consumer test program  
For Greener Cars**

UNECE GRPE meeting, 15 January 2021

# Partners



# Aims

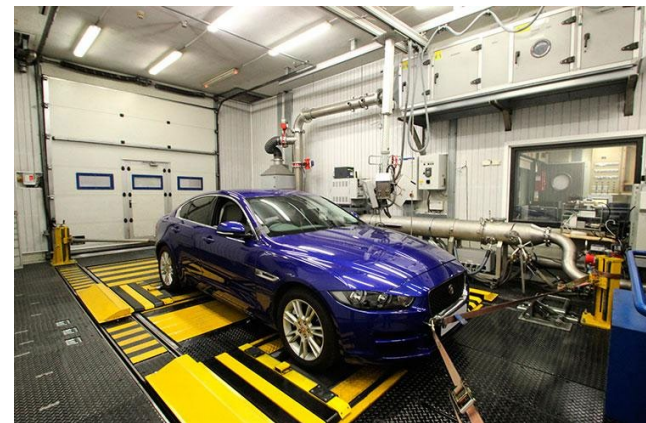
- Provide comprehensive, simple rating information to consumers, fleet operators and other stakeholders
  - Stimulate real green cars to enter the market
  - Reduce Pollutant and Greenhouse Gas (GHG) emissions
  - Restoring consumer confidence in test information
- Spark competition among vehicle manufacturers
  - Transparency and making available detailed test result and analysis



# “Green Vehicle Index”

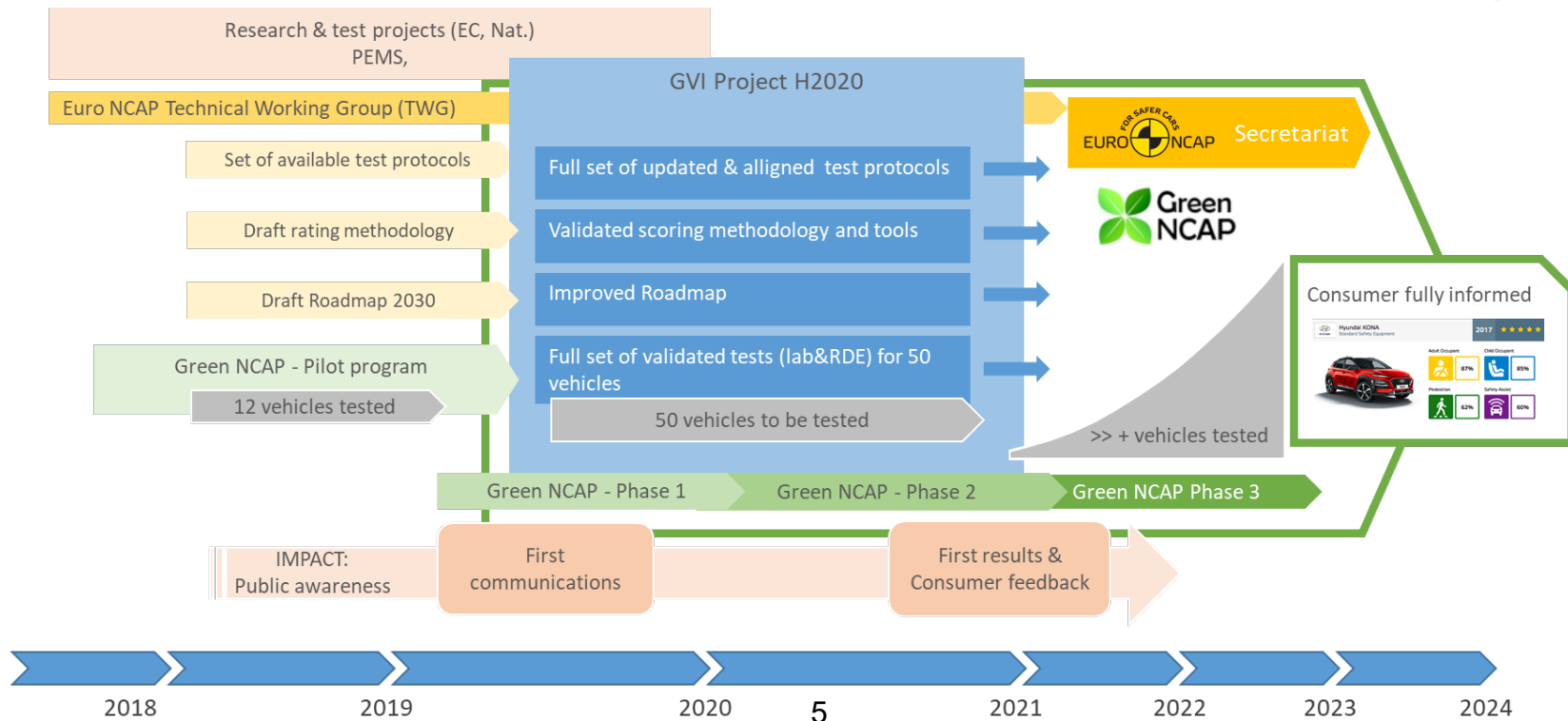


- Horizon 2020 Project is the catalyst for future developments Green NCAP
  - Full set of improved and aligned test protocols
  - Validated scoring methodology & tools
  - Updated roadmap
  - Full set of validated tests (lab & PEMS real-world) for 49 cars



<https://www.gvi-project.eu/>

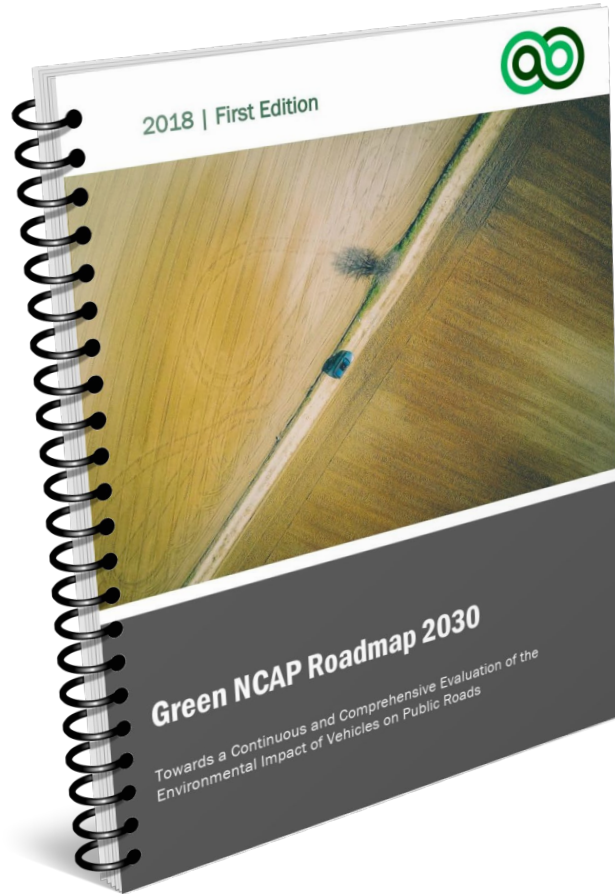
# “Green Vehicle Index”



# Green NCAP test program 2020 and 2021

- Test 50 vehicles for publications in November 2020 and February 2021
- 49 vehicle tests sponsored by European Commission
- Select additional 12 test vehicles and publish later in 2021
- Finalise transition to mature test program





## Roadmap 2030

- Future steps to develop the programme further
- Based on stakeholder input
- Includes well-to-wheel and life cycle assessment, driving range, in-vehicle air quality etc.
- Will be updated from time to time, currently under revision

# Test Matrix Overview 2020



## Laboratory

---

*Approval test cycles under average ambient conditions (@ 14°C)*

- WLTC+ cold (+ 14 °C)
- WLTC+ cold ambient (-7 °C)
- WLTC+ PEMS correlation
- Driving Range (for info)

## Robustness (Laboratory & Real-World)

---

*Custom-tailored tests with variations of vehicle settings, low and high engine load*

- WLTC regular warm
- BAB 130 motorway
- PEMS+ warm Eco
- PEMS+ warm Heavy load
- PEMS+ cold start and 8 km warm-up
- PEMS+ congestion simulation

## PEMS (Real-World)

---

*Custom-tailored approval driving tests under real-world ambient conditions*

- PEMS+ regular cold (2x)

## Engine Load (Max Curve Mapping)

---

*Custom-tailored sweep test to visualise maximum engine load operation sampling*

- Sweep test to log maximum engine load versus engine speed (fully depressed accelerator pedal)

Note: Independent, direct access to vehicle data via OBD interface or remotely via telematics unit is required



# Harmonisation with UNECE requirements

- WLTC+ and PEMS+ test procedures based on UNECE test procedures and requirements
  - Definitions based on UN Mutual Resolution No 2, UN GTR No 15 etc
  - WLTC+ test procedure based on 2<sup>nd</sup> EU implementation of UN GTR No 15
  - In general, Green NCAP will synchronize its test requirements as much as possible with UNECE test procedures and their amendments based on GRPE & WP29 decisions
- For some details there is a need for deviation and/or supplements
  - EU implementation of UNECE test procedures need to be expanded, e.g. EU non-regulated pollutant NH<sub>3</sub> and non-regulated GHG N<sub>2</sub>O deemed needed for Green NCAP rating
  - Simplification, e.g. complex gear shift instructions replaced with vehicle's Gear Shift Indicator

# Example adaptation WLTC+ test procedure



## Test cycle description - WLTC cold (engine)

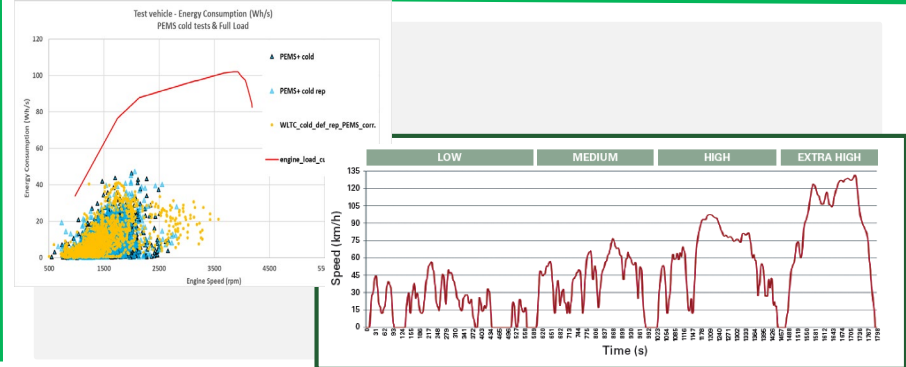
- Based on type-approval test conditions, but...
- more realistic ambient temperature: 14°C instead of 23°
- more realistic vehicle climatization (heating, A/C switched on)
- Gear shift points based on vehicle's Gear Shift Indicator

## Motivation

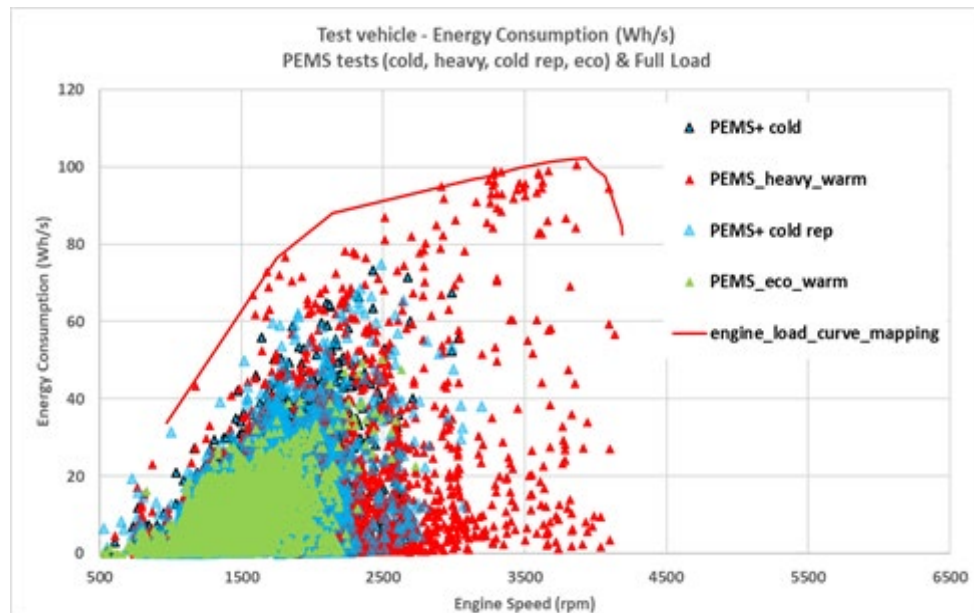
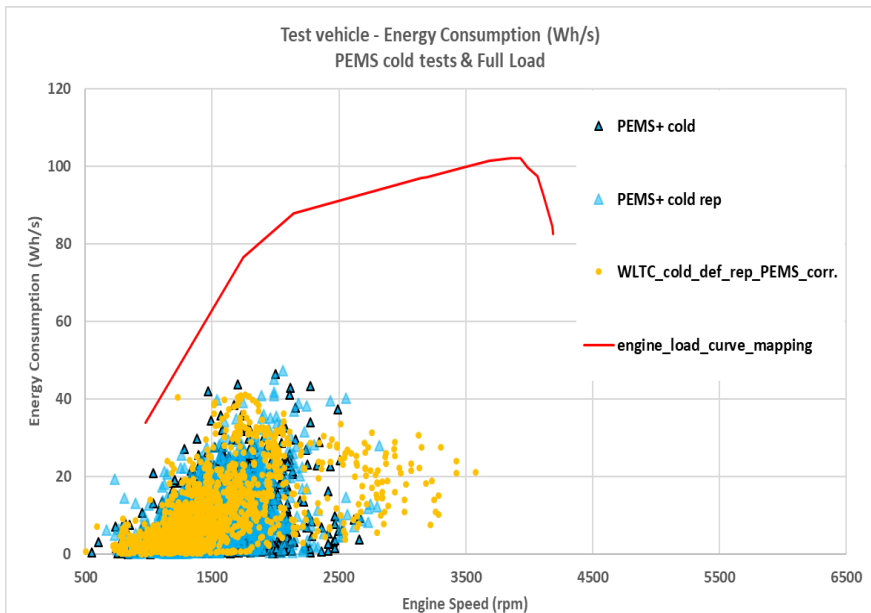
- Verification of the type approval values
- Measure unregulated pollutant and GHG emissions
- Identification of test cycle detection (changed test conditions)
- Repetition of the test cycle for best reliable test results

## Results

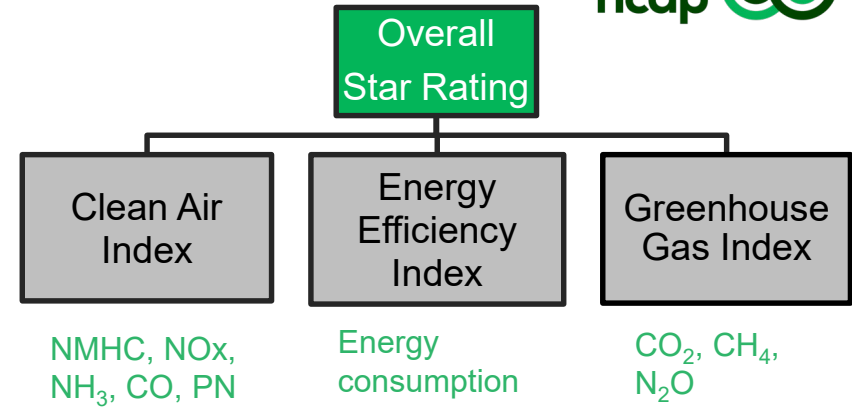
- Fuel/Energy consumption and GHG emissions
- Rating of TtW energy consumption for a fair comparison of all different propulsion systems
- Rating of emissions: CO<sub>2</sub>, CO, NO<sub>x</sub>, NMHC, CH<sub>4</sub>, PM, PN and also NO, NO<sub>2</sub>, NH<sub>3</sub>, N<sub>2</sub>O
- Lab results validated with Real-World PEMS+ tests: CO<sub>2</sub>, CO, NO<sub>x</sub>, PN, NO, NO<sub>2</sub>.



# Mapping of test sampling



# Rating scheme 2020



→ Overall Star rating:

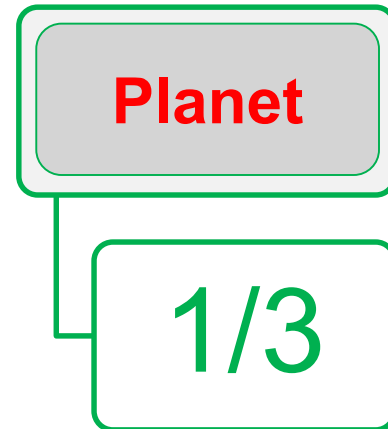
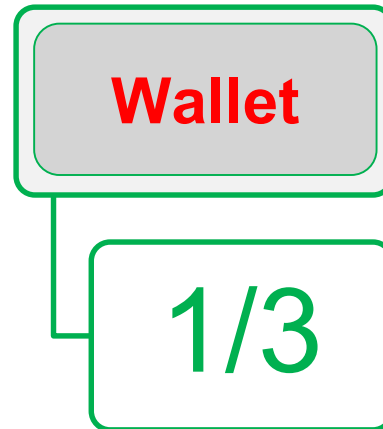
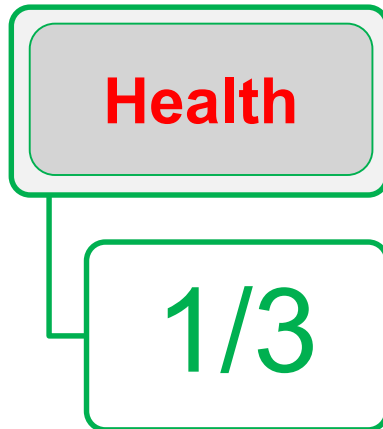
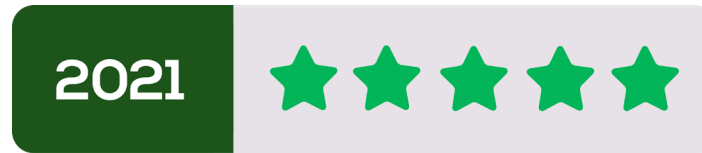
- 0 (poor) to 5 (best) stars
- Half stars

→ Principles:

- Applicable to ICE (petrol, diesel, CNG), HEV, PHEV, BEV, FCEV
- Provide resolution between all the available technologies
- Technology neutral

WLTC	10.0	Energy Consumption (WLTC-cold 14° C)	10.0	WLTC	7.0
WLTC-CAT	10.0	Energy Consumption (WLTC-cold -7° C)	10.0	WLTC-CAT	7.0
WLTC-warm	10.0	Energy Consumption (WLTC-warm)	10.0	WLTC-warm	7.0
BAB130	10.0	Energy Consumption (BAB130)	10.0	BAB130	7.0
PEMS+ cold engine 1	5.0	PEMS+ cold engine1	-	PEMS+ cold engine 1	-
PEMS+ cold engine 2	5.0	PEMS+ cold engine2	-	PEMS+ cold engine 2	-
PEMS light test	5.0			PEMS light test	-
PEMS heavy test	8.0			PEMS heavy test	-
PEMS 8km (1)	5.0	Driving Range <sup>1)</sup>	-	PEMS 8km (1)	-
PEMS Congestion	2.0	Driving Resistance <sup>1)</sup>	-		
<b>Total Score</b>	<b>70.0</b>	<b>40.0</b>		<b>28.0</b>	
<b>Max Points available</b>	<b>70.0</b>	<b>40.0</b>		<b>28.0</b>	

# Rating scheme 2021



Stay tuned, more to come in February 2021



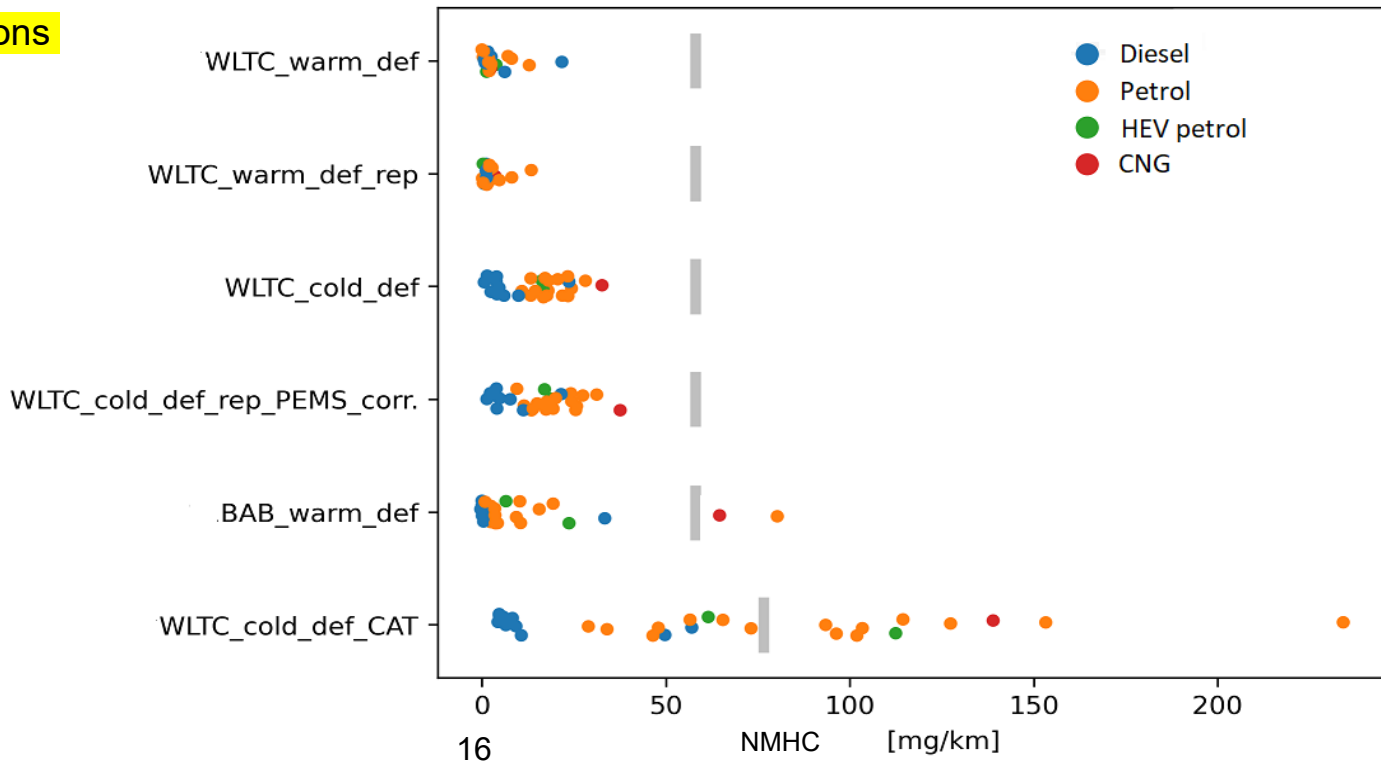
For more information:

- Please visit our website at: [www.greenncap.com](http://www.greenncap.com)
- Contact the Green NCAP secretariat: [info@greenncap.com](mailto:info@greenncap.com)

# Back-up November 2020 results

# Test results test program 2020 - Pollutants

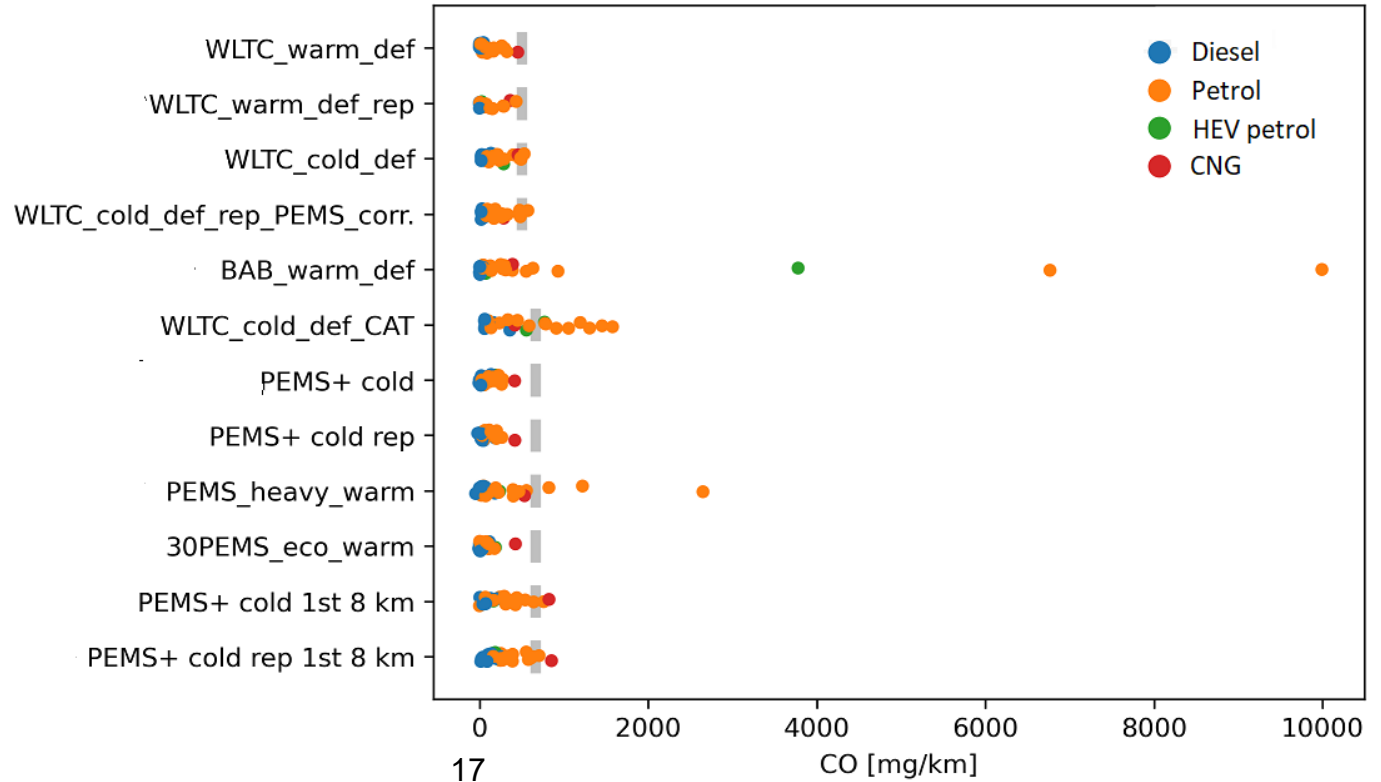
## Non-Methane Hydrocarbons (NMHC)





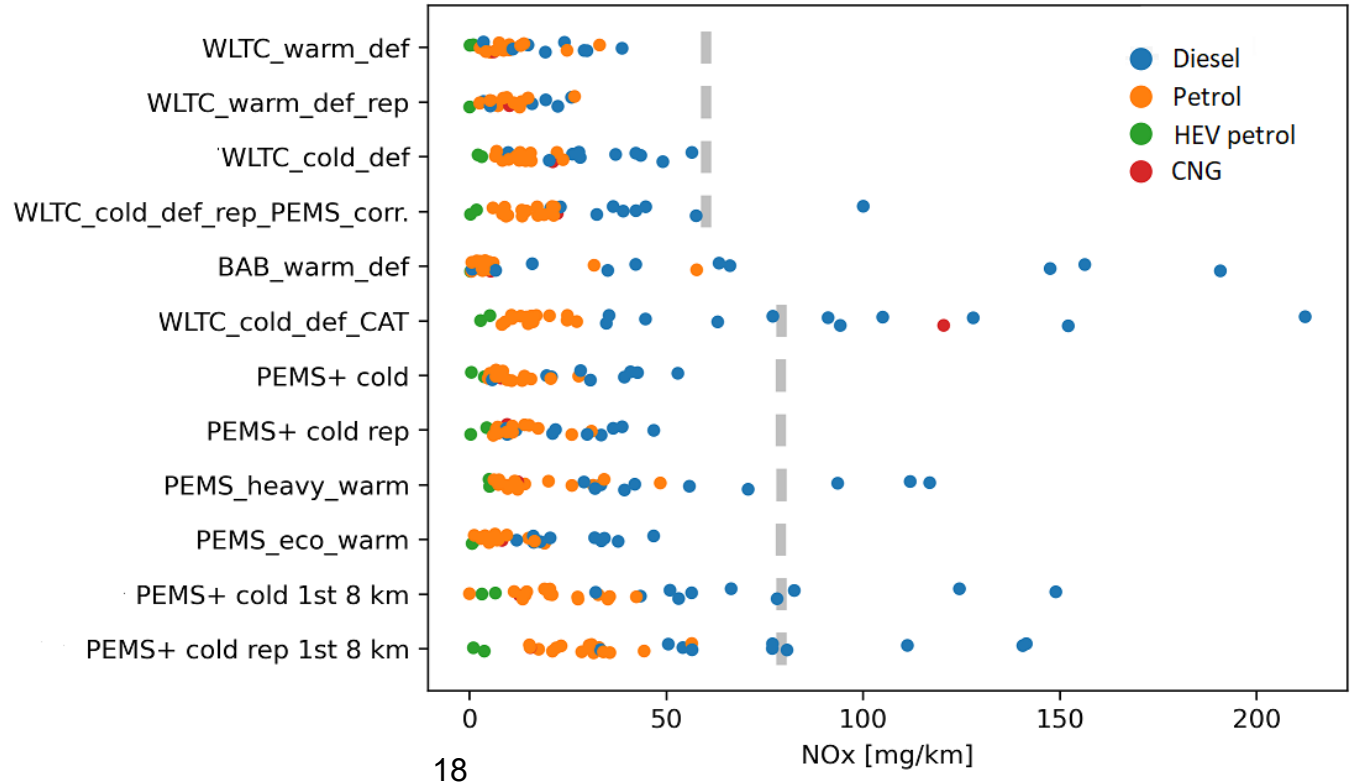
# Test results test program 2020 - Pollutants

## Carbon Monoxide (CO)



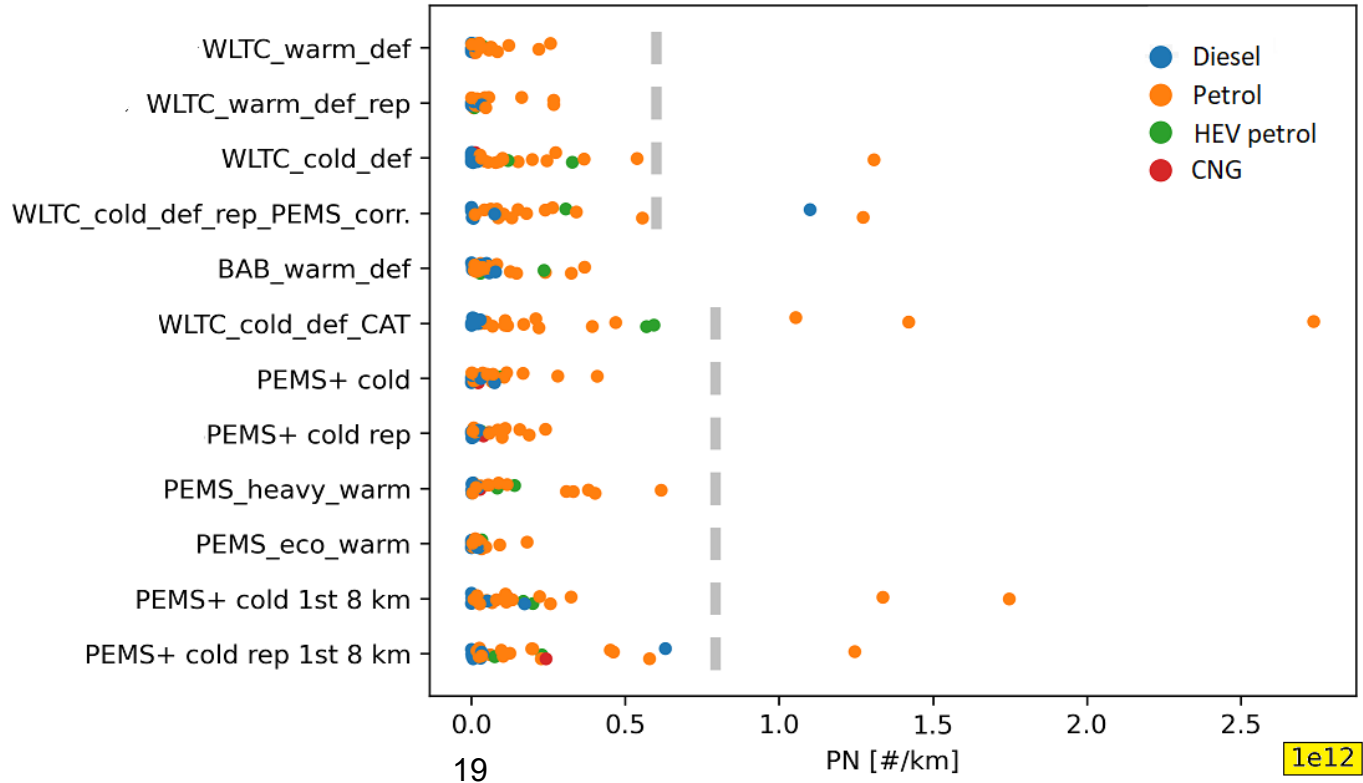
# Test results test program 2020 - Pollutants

## Nitrogen Oxides (NOx)



# Test results test program 2020 - Pollutants

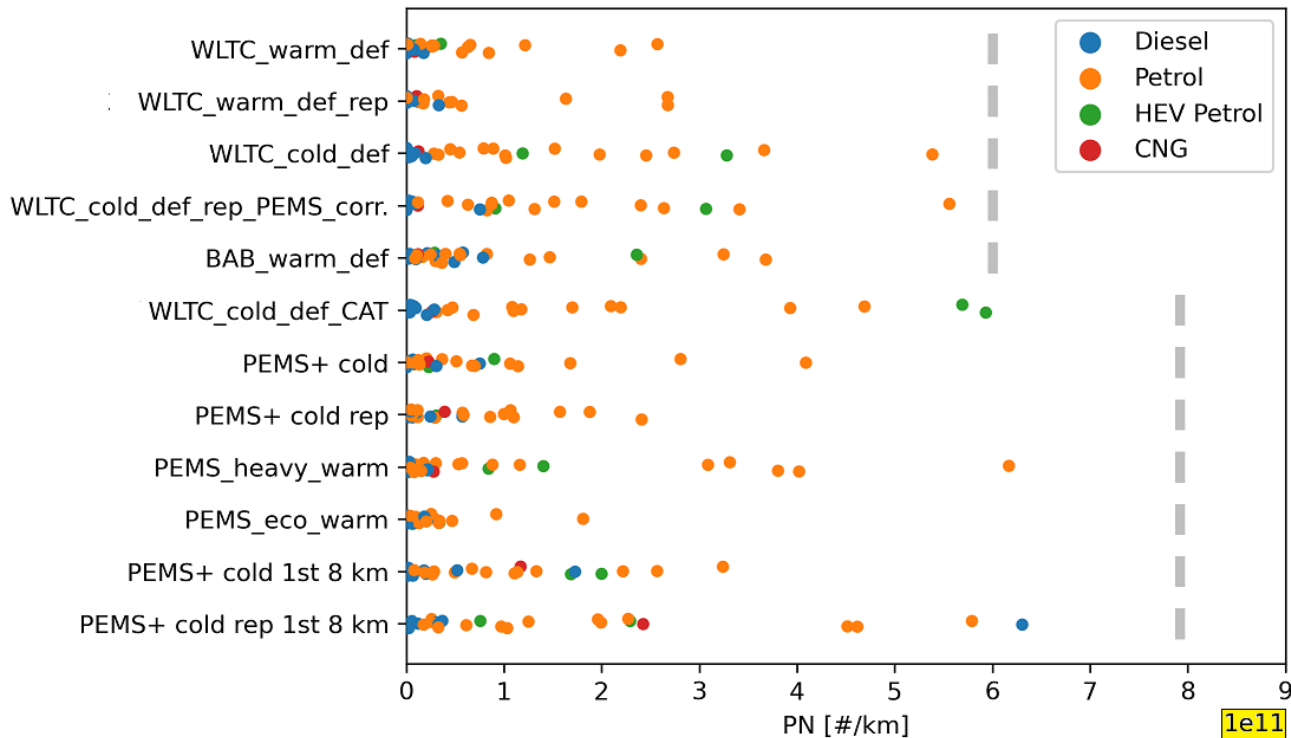
Particle Number (PN)  
 Max scale  $1 \cdot 10^{12}$



# Test results test program 2020 - Pollutants

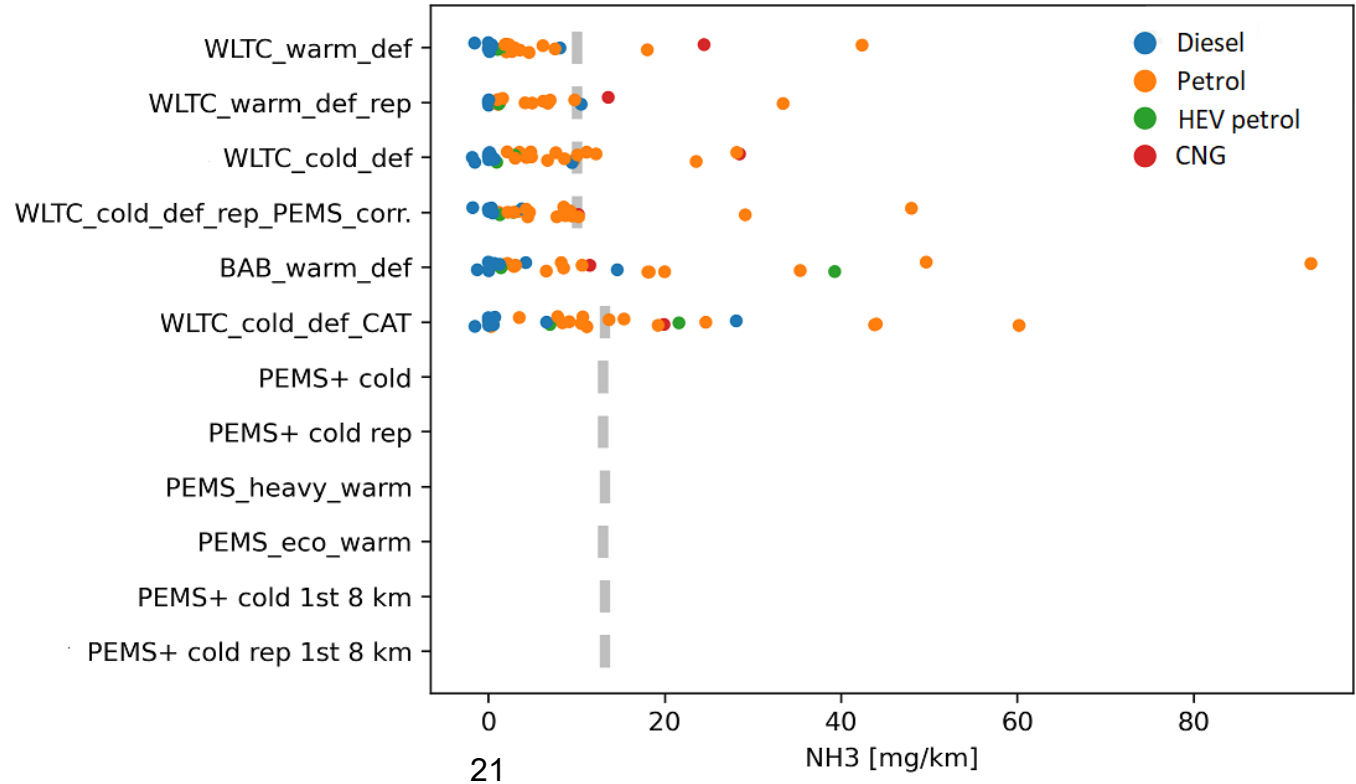
Particle Number (PN)

Max scale  $1 \cdot 10^{11}$



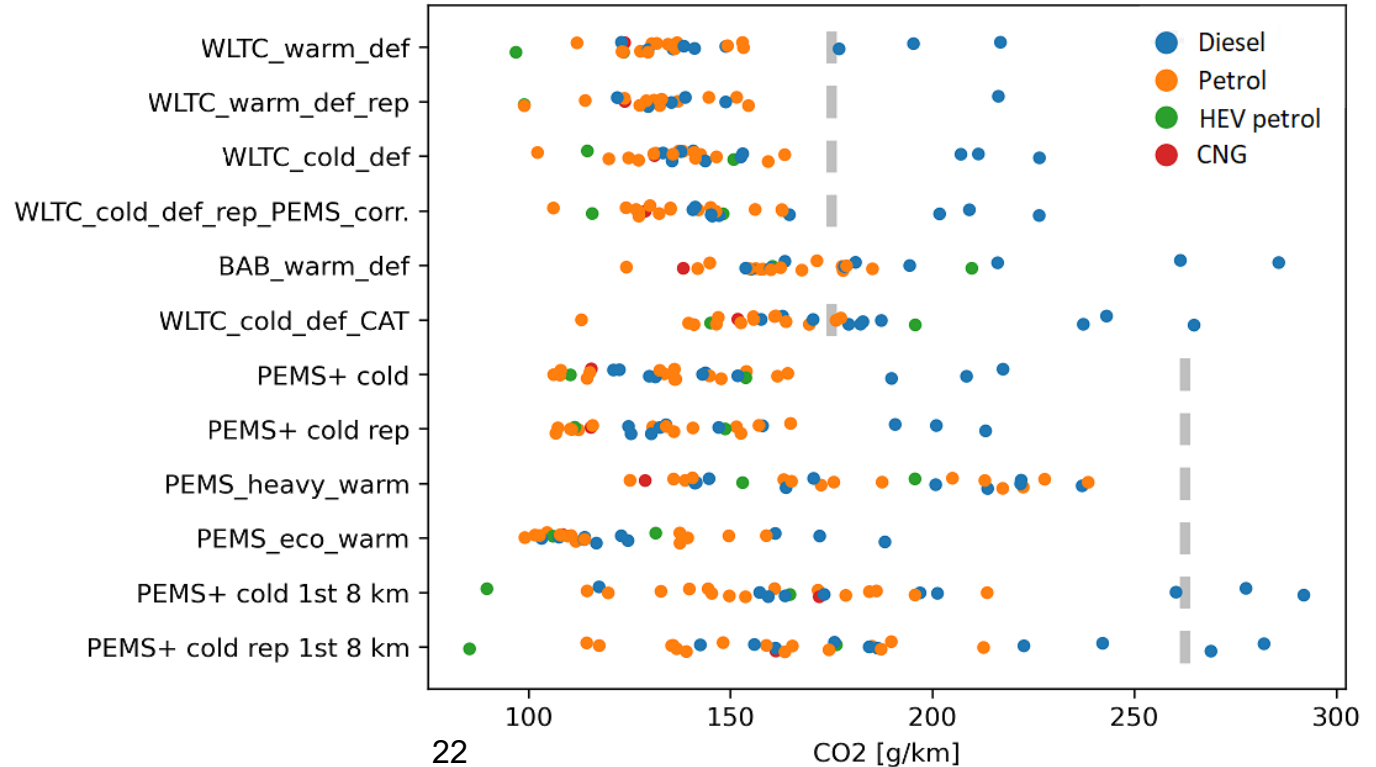
# Test results test program 2020 - Pollutants

Ammonia ( $NH_3$ )



# Test results test program 2020 – GHG

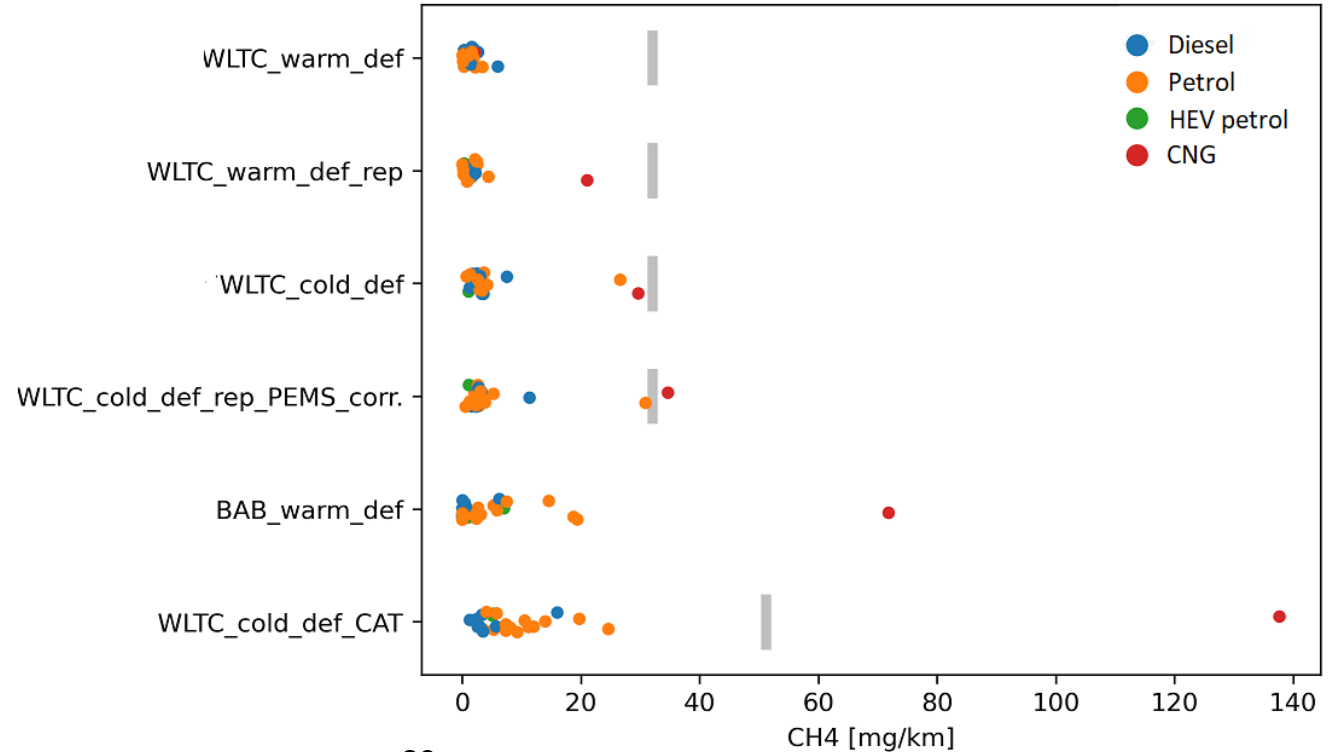
## Carbon Dioxide (CO<sub>2</sub>)



# Test results test program 2020 – GHG

Methane (CH<sub>4</sub>)

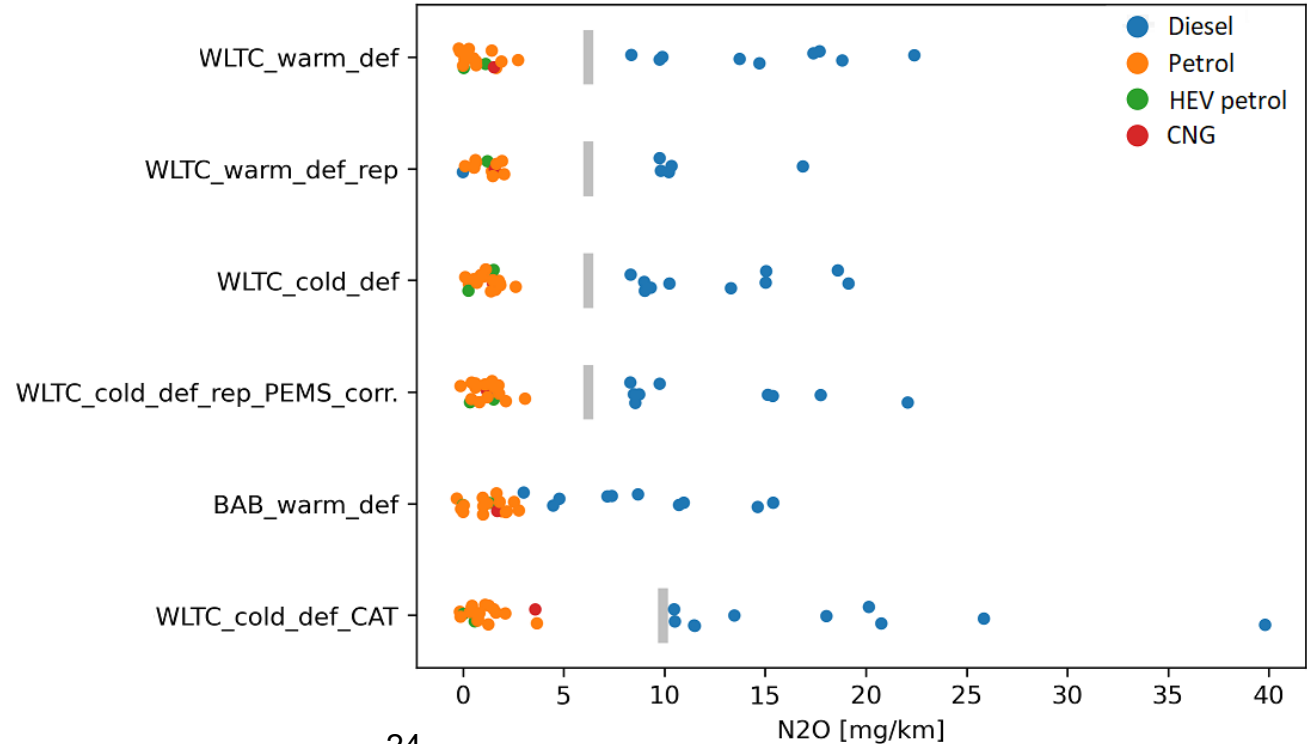
GWP=25



# Test results test program 2020 – GHG

Laughing Gas (N<sub>2</sub>O)

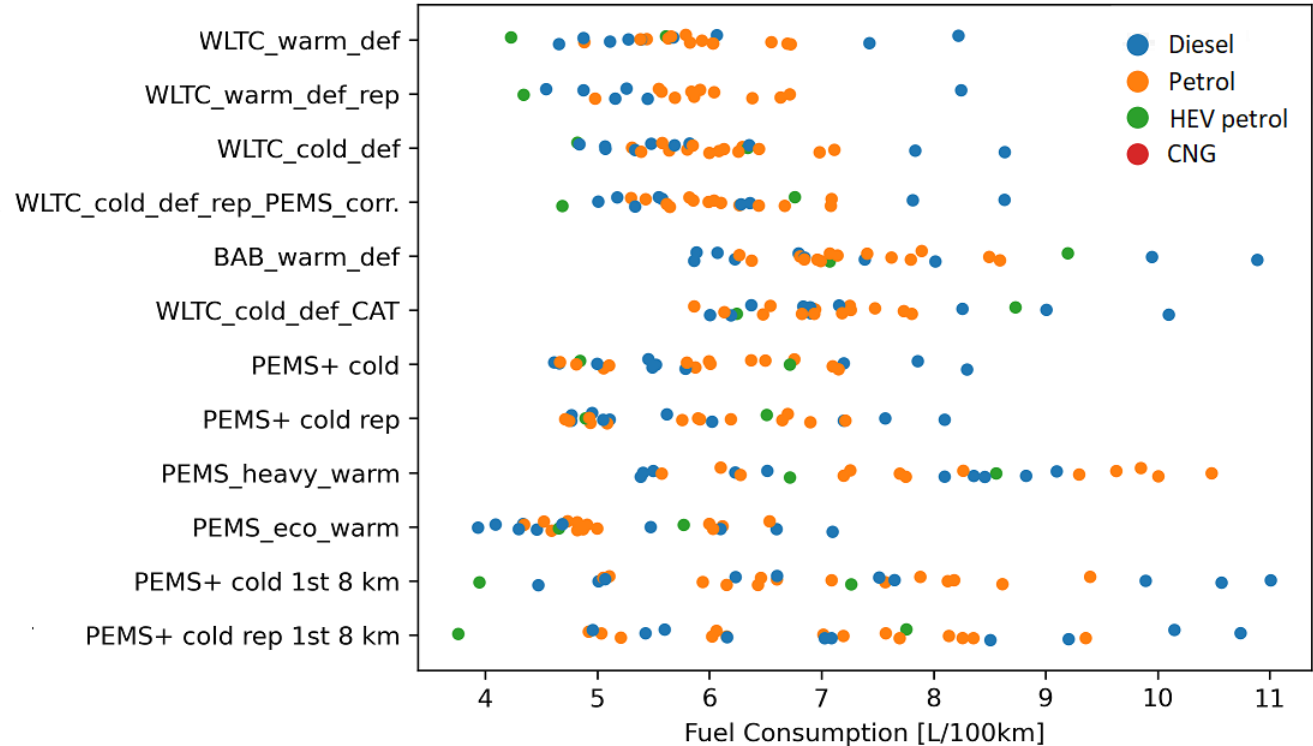
GWP=298





# Test results test program 2020 – Energy Efficiency

## Fuel Consumption



# Test results test program 2020 – Energy Efficiency

## Energy Consumption

