Supplementary Materials

Table S1. Results of F-test and t-test for NOx, CO_2 and CO and the F or t criteria values for a given degree of freedom (n) to assess equivalency, as prescribed by the UN R49.

	n	Criteria value	NOx	CO_2	CO
$F_{PEMS\ QCL-IR}$	7	2.785	0.967	1.118	0.980
$t_{PEMS\ QCL-IR}$	7	1.895	0.470	1.525	0.281
$F_{PEMS\ FTIR-1}$	8	2.589	0.939	1.142	1.303
$t_{PEMS\ FTIR-1}$	8	1.860	0.025	0.385	0.490
$F_{LAB\ FTIR-2}$	8	2.589	0.961	0.975	1.433
$t_{LAB\ FTIR-2}$	8	1.860	0.039	1.015	0.690
$F_{LAB\ QCL-IR}$	7	2.785	1.031		
$t_{LAB\ QCL-IR}$	7	1.895	0.118		

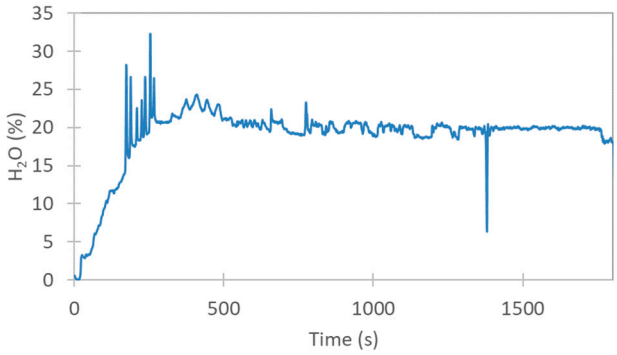
Table S2. Emission factor for NOx, CH_4, CO, NH_3, N_2O, HCHO and CO_2 measured during all tests using the instruments under study as well as the reference instruments. T stands for ambient temperature.

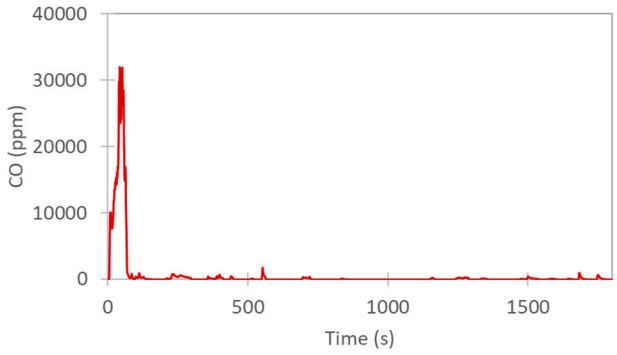
	Cycle	T (°C)	CLD	Lab_{FTIR-1}	$PEMS_{QCL-IR}$	Lab_{QCL-IR}	$PEMS_{FTIR-1}$	Lab_{FTIR-2}	$PEMS_{FTIR-2}$
	$WHVC_{Cold}$	23	0.148	0.143	0.164	0.152	0.168	0.162	0.156
	$WHVC_{Hot}$	23	0.086	0.078	0.089	0.095	0.098	0.096	0.089
	ISC	23	0.067	0.064	0.077	0.067	0.075	0.072	0.074
	$WHVC_{Cold}$	0	0.105	0.103	0.099	0.110	0.112	0.118	0.111
NOx	$WHVC_{Hot}$	0	0.044	0.040	0.040	0.046	0.048	0.049	0.044
	ISC	0	0.052	0.048	-	0.053	0.057	0.054	0.053
	$WHTC_{Cold}$	23	0.772	-	0.748	-	0.734	0.749	-
	$WHTC_{Hot}$	23	0.086	-	0.090	0.089	0.087	0.087	-
	ISC	23	0.299	-	0.308	0.306	0.300	0.302	-
	Cycle	**T (°C)**	**FID**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**		**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**
	$WHVC_{Cold}$	23	0.310	0.291	0.345		0.302	0.286	0.276
	$WHVC_{Hot}$	23	0.149	0.138	0.173		0.143	0.134	0.134
	ISC	23	0.076	0.071	0.073		0.072	0.068	0.069
	$WHVC_{Cold}$	0	0.252	0.232	0.225		0.242	0.238	0.224
CH_4	$WHVC_{Hot}$	0	0.243	0.229	0.216		0.242	0.221	0.215
	ISC	0	0.072	0.068	0.000		0.070	0.065	0.066
	$WHTC_{Cold}$	23	-	-	0.006		0.005	-0.003	-
	$WHTC_{Hot}$	23	-	-	0.003		0.004	-0.003	-
	ISC	23	-	-	0.002		0.004	-0.003	-
	Cycle	**T (°C)**	**NDIR**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**		**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**
CO	$WHVC_{Cold}$	23	0.877	0.915	0.991		0.996	1.003	0.955

	$WHVC_{Hot}$	23	0.396	0.386	0.427		0.413	0.430	0.429
	ISC	23	0.311	0.305	-		0.333	0.340	0.335
	$WHVC_{Cold}$	0	3.379	3.871	-		4.048	3.988	3.787
	$WHVC_{Hot}$	0	0.253	0.270	-		0.295	0.315	0.312
	ISC	0	0.577	0.600	0.339		0.632	0.658	0.639
	$WHTC_{Cold}$	23	0.252	-	0.284		0.276	0.270	-
	$WHTC_{Hot}$	23	0.030	-	0.023		0.029	0.027	-
	ISC	23	0.033	-	0.023		0.027	0.030	-
	Cycle	**T (°C)**	**-**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**	**Lab_{QCL-IR}**	**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**
	$WHVC_{Cold}$	23			0.071	0.076	0.059	0.073	0.074
	$WHVC_{Hot}$	23			0.067	0.072	0.061	0.067	0.066
	ISC	23			0.014	0.014	0.014	0.015	0.015
	$WHVC_{Cold}$	0			0.152	0.135	0.130	0.143	0.109
NH_3	$WHVC_{Hot}$	0			0.044	0.040	0.000	0.044	0.045
	ISC	0			0.035	0.000	0.034	0.035	0.036
	$WHTC_{Cold}$	23			-	0.002	0.000	0.000	0.002
	$WHTC_{Hot}$	23			-	0.003	0.000	0.000	0.002
	ISC	23			-	0.002	0.000	0.000	0.001
	Cycle	**T (°C)**	**-**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**	**Lab_{QCL-IR}**	**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**
	$WHVC_{Cold}$	23		0.007	0.007	0.007	0.008	0.007	0.007
	$WHVC_{Hot}$	23		0.001	0.002	0.000	0.001	0.000	0.000
	ISC	23		0.002	0.005	0.003	0.003	0.002	0.002
	$WHVC_{Cold}$	0		0.005	0.006	0.004	0.008	0.004	0.004
N_2O	$WHVC_{Hot}$	0		0.001	0.002	0.000	0.001	0.000	0.000
	ISC	0		0.005	0.000	0.004	0.005	0.003	0.003
	$WHTC_{Cold}$	23		-	0.035	0.031	0.032	0.031	-
	$WHTC_{Hot}$	23		-	0.047	0.041	0.043	0.044	-
	ISC	23		-	0.038	0.035	0.036	0.036	-
	Cycle	**T (°C)**	**-**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**		**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**
	$WHVC_{Cold}$	23		0.001	0.002		0.000	0.000	0.001
	$WHVC_{Hot}$	23		0.000	0.000		0.001	0.000	0.000
	ISC	23		0.001	0.002		0.000	0.001	0.001
	$WHVC_{Cold}$	0		0.001	0.001		0.001	0.002	0.002
HCHO	$WHVC_{Hot}$	0		0.000	0.000		0.000	0.001	0.001
	ISC	0		0.000	0.000		0.001	0.001	0.001
	$WHTC_{Cold}$	23			0.004		0.001	-0.002	
	$WHTC_{Hot}$	23			0.001		0.001	-0.003	
	ISC	23			0.000		0.001	0.000	
	Cycle	**T (°C)**	**NDIR**	**Lab_{FTIR-1}**	**$PEMS_{QCL-IR}$**		**$PEMS_{FTIR-1}$**	**Lab_{FTIR-2}**	**$PEMS_{FTIR-2}$**

	$WHVC_{Cold}$	23	695	661	707	696	694	663
	$WHVC_{Hot}$	23	669	636	669	670	660	637
	ISC	23	642	610	649	639	630	612
	$WHVC_{Cold}$	0	721	701	734	741	709	710
CO_2	$WHVC_{Hot}$	0	709	689	720	708	706	689
	ISC	0	655	630		669	669	641
	$WHTC_{Cold}$	23	595		588	588	594	
	$WHTC_{Hot}$	23	562		559	548	560	
	ISC	23	602		600	600	601	

WHVC: World harmonized vehicle cycle; WHTC: World harmonized transient cycle; ISC: In-service conformity-like cycle; CLD: Chemiluminescence detector; FID: Flame ionization detector; NDIR: Non-dispersive infrared.





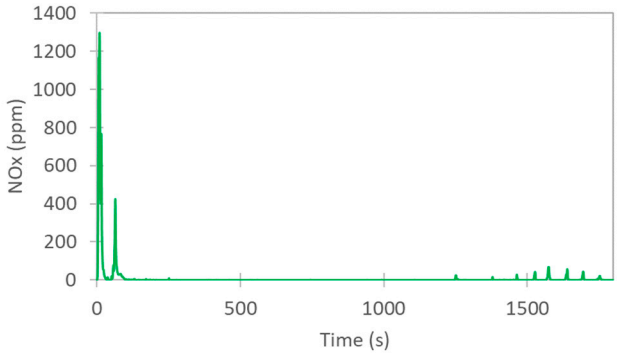


Figure S1. Example of (top panel) water, (center panel) CO and (bottom panel) NOx concentration in the CNG exhaust measured by the LAB_{FTIR-1} over the $WHVC_{Cold}$ at 0°C.