

### Supplementary Material. Tables of results

**Table S1.** Fuel mass injected per stroke (mg/st) in every experimental tested.

P <sub>inj</sub> (bar)	Average fuel mass injection per stroke (mg/st)									ET (ms)	Tf (°C)		
	115μm			130μm			150μm						
	Diesel	HVO	GtL	Diesel	HVO	GtL	Diesel	HVO	GtL				
500	3.63	3.70	3.50	4.16	3.90	4.13	5.33	4.83	5.20	1.0	20		
700	4.46	4.23	4.16	5.23	4.93	5.02	6.43	6.33	6.33				
900	4.93	4.83	4.73	5.86	5.63	5.70	7.13	6.69	6.93				
1100	5.53	5.23	5.13	6.43	6.00	6.23	7.89	7.86	7.63				
500	4.83	4.73	4.66	5.66	5.43	5.46	7.10	7.13	6.95	1.5		20	
700	5.86	5.56	5.55	6.93	6.83	6.56	8.49	8.39	8.39				
900	6.73	6.50	6.36	7.93	7.50	7.46	9.76	9.46	9.46				
1100	7.27	7.13	7.13	8.73	8.39	8.29	10.83	10.69	10.36				
500	6.1	5.83	6.00	7.20	7.00	6.90	8.89	8.69	8.76	2.0			20
700	7.26	7.05	7.09	8.69	8.29	8.43	10.73	10.66	10.49				
900	8.33	8.06	8.06	9.99	9.56	9.53	12.46	12.06	11.96				
1100	9.36	9.03	8.79	10.93	10.56	10.66	13.66	13.39	13.06				
500	3.46	3.60	3.56	4.23	4.06	4.13	5.06	5.13	5.13	1.0	40		
700	4.40	4.30	4.33	5.33	4.86	4.93	6.26	6.16	6.06				
900	4.90	4.93	4.73	5.86	5.46	5.66	7.06	6.93	6.83				
1100	5.50	5.26	5.23	6.46	5.96	6.20	7.69	7.59	7.49				
500	4.86	4.56	4.63	5.93	5.40	5.63	7.00	6.76	6.90	1.5		40	
700	5.90	5.63	5.63	6.90	6.63	6.66	8.53	8.36	8.19				
900	6.63	6.46	6.53	7.96	7.43	7.56	9.69	9.46	9.33				
1100	7.39	7.03	7.06	8.76	8.26	8.43	10.83	10.49	10.35				
500	6.10	5.93	5.93	7.20	6.80	6.93	8.83	8.69	8.59	2.0			40
700	7.36	7.23	7.00	8.86	8.26	8.33	10.69	10.46	10.36				
900	8.36	8.06	8.13	10.03	9.62	9.49	12.33	12.06	11.82				
1100	9.33	8.86	8.69	10.96	10.63	10.69	13.52	13.39	13.12				

**Table S2.** Time values for each phase for nozzle with 115  $\mu\text{m}$ 

P <sub>inj</sub> (bar)	Time value (s)									ET (ms)	T <sub>f</sub> (°C)
	Needle lift			Holding injection			Needle closure				
	Diesel	HVO	GtL	Diesel	HVO	GtL	Diesel	HVO	GtL		
500	0.21-0.63	0.19-0.63	0.19-0.63	0.63-1.88	0.63-1.88	0.63-1.88	1.88-2.16	1.88-2.19	1.88-2.19	1.0	20
700	0.17-0.52	0.18-0.50	0.17-0.51	0.52-1.89	0.50-1.88	0.51-1.87	1.89-2.33	1.88-2.33	1.87-2.33		
900	0.16-0.48	0.16-0.47	0.14-0.47	0.48-1.87	0.47-1.84	0.47-1.83	1.87-2.32	1.84-2.32	1.83-2.32		
1100	0.15-0.47	0.16-0.46	0.16-0.46	0.47-1.83	0.46-1.82	0.46-1.80	1.83-2.32	1.82-2.32	1.80-2.32		
500	0.19-0.57	0.18-0.57	0.18-0.57	0.57-2.46	0.57-2.39	0.57-2.39	2.46-2.78	2.39-2.73	2.39-2.73	1.5	
700	0.17-0.52	0.17-0.49	0.16-0.50	0.52-2.39	0.49-2.38	0.50-2.35	2.39-2.70	2.38-2.76	2.35-2.77		
900	0.15-0.48	0.17-0.45	0.14-0.46	0.48-2.38	0.45-2.37	0.46-2.35	2.38-2.78	2.37-2.77	2.35-2.78		
1100	0.15-0.46	0.15-0.46	0.15-0.46	0.46-2.35	0.46-2.34	0.46-2.33	2.35-2.75	2.34-2.75	2.33-2.75		
500	0.20-0.58	0.20-0.58	0.20-0.58	0.58-2.94	0.58-2.91	0.58-2.94	2.94-3.28	2.91-3.28	2.94-3.28	2.0	
700	0.18-0.52	0.17-0.50	0.17-0.50	0.52-2.89	0.50-2.89	0.50-2.86	2.89-3.31	2.89-3.31	2.86-3.31		
900	0.16-0.47	0.15-0.45	0.14-0.46	0.47-2.86	0.45-2.84	0.46-2.85	2.86-3.28	2.84-3.28	2.85-3.27		
1100	0.15-0.45	0.12-0.45	0.16-0.47	0.45-2.86	0.45-2.85	0.47-2.84	2.86-3.33	2.85-3.32	2.84-3.32		
500	0.18-0.63	0.18-0.64	0.19-0.64	0.63-1.89	0.64-1.88	0.64-1.88	1.89-2.19	1.88-2.18	1.88-2.16	1.0	40
700	0.17-0.53	0.15-0.49	0.15-0.51	0.53-1.91	0.49-1.88	0.51-1.85	1.91-2.32	1.88-2.33	1.85-2.30		
900	0.16-0.50	0.16-0.45	0.16-0.45	0.50-1.85	0.45-1.82	0.45-1.81	1.85-2.32	1.82-2.31	1.81-2.30		
1100	0.17-0.48	0.14-0.46	0.12-0.46	0.48-1.83	0.46-1.82	0.46-1.80	1.83-2.32	1.82-2.32	1.80-2.30		
500	0.19-0.57	0.18-0.59	0.18-0.58	0.57-2.46	0.59-2.39	0.58-2.40	2.46-2.78	2.39-2.73	2.40-2.72	1.5	
700	0.15-0.52	0.17-0.50	0.17-0.49	0.52-2.40	0.50-2.38	0.49-2.37	2.40-2.77	2.38-2.76	2.37-2.77		
900	0.17-0.49	0.16-0.47	0.14-0.45	0.49-2.36	0.47-2.38	0.45-2.34	2.36-2.78	2.38-2.77	2.34-2.76		
1100	0.16-0.47	0.13-0.46	0.16-0.47	0.47-2.35	0.46-2.35	0.47-2.35	2.35-2.75	2.35-2.75	2.35-2.74		
500	0.19-0.58	0.18-0.59	0.20-0.58	0.58-2.94	0.59-2.91	0.58-2.91	2.94-3.28	2.91-3.27	2.91-3.26	2.0	
700	0.19-0.53	0.15-0.49	0.14-0.49	0.53-2.93	0.49-2.89	0.49-2.89	2.93-3.31	2.89-3.30	2.89-3.29		
900	0.16-0.48	0.16-0.45	0.14-0.46	0.48-2.86	0.45-2.86	0.46-2.84	2.86-3.28	2.86-3.27	2.84-3.26		
1100	0.16-0.48	0.14-0.46	0.15-0.45	0.48-2.86	0.46-2.86	0.45-2.85	2.86-3.33	2.86-3.32	2.85-3.30		

**Table S3.** Time values for each phase for nozzle with 130 µm

Pinj (bar)	Time value (s)									ET (ms)	Tf (°C)
	Needle lift			Holding injection			Needle closure				
	Diesel	HVO	GtL	Diesel	HVO	GtL	Diesel	HVO	GtL		
500	0.18-0.65	0.17-0.67	0.17-0.59	0.65-1.87	0.67-1.82	0.59-1.88	1.87-2.19	1.82-2.19	1.88-2.16	1.0	20
700	0.16-0.55	0.18-0.54	0.16-0.58	0.55-1.81	0.54-1.82	0.58-1.83	1.81-2.31	1.82-2.32	1.83-2.31		
900	0.15-0.49	0.18-0.49	0.16-0.48	0.49-1.80	0.49-1.75	0.48-1.74	1.80-2.32	1.72-2.32	1.74-2.32		
1100	0.14-0.49	0.15-0.49	0.16-0.47	0.49-1.77	0.49-1.78	0.47-1.78	1.77-2.32	1.78-2.30	1.78-2.32		
500	0.19-0.61	0.18-0.69	0.19-0.60	0.61-2.39	0.69-2.37	0.60-2.37	2.39-2.73	2.37-2.73	2.37-2.73	1.5	
700	0.17-0.59	0.16-0.56	0.17-0.58	0.59-2.34	0.56-2.32	0.58-2.32	2.34-2.75	2.32-2.76	2.32-2.73		
900	0.16-0.53	0.16-0.51	0.16-0.49	0.53-2.32	0.51-2.31	0.49-2.33	2.32-2.75	2.31-2.73	2.33-2.72		
1100	0.14-0.49	0.18-0.49	0.16-0.49	0.49-2.31	0.49-2.30	0.49-2.29	2.31-2.75	2.30-2.75	2.29-2.73		
500	0.18-0.63	0.19-0.68	0.19-0.61	0.63-2.88	0.68-2.86	0.61-2.89	2.88-3.28	2.86-3.27	2.89-3.26	2.0	
700	0.16-0.59	0.17-0.55	0.17-0.56	0.59-2.82	0.55-2.84	0.56-2.82	2.82-3.33	2.84-3.32	2.82-3.33		
900	0.16-0.53	0.15-0.53	0.15-0.49	0.53-2.83	0.53-2.81	0.49-2.79	2.83-3.32	2.81-3.31	2.79-3.30		
1100	0.16-0.49	0.15-0.48	0.14-0.47	0.49-2.81	0.48-2.80	0.47-2.80	2.81-3.32	2.80-3.30	2.80-3.32		
500	0.17-0.64	0.20-0.63	0.19-0.62	0.64-1.87	0.63-1.86	0.62-1.87	1.87-2.19	1.86-2.19	1.87-2.16	1.0	40
700	0.16-0.55	0.17-0.56	0.18-0.52	0.55-1.80	0.56-1.83	0.52-1.83	1.80-2.31	1.83-2.31	1.83-2.31		
900	0.15-0.50	0.15-0.49	0.16-0.50	0.50-1.76	0.49-1.80	0.50-1.79	1.76-2.32	1.80-2.32	1.79-2.31		
1100	0.16-0.51	0.15-0.49	0.15-0.47	0.51-1.79	0.49-1.78	0.47-1.74	1.79-2.32	1.78-2.31	1.74-2.30		
500	0.17-0.63	0.22-0.66	0.18-0.57	0.63-2.37	0.66-2.38	0.57-2.33	2.37-2.73	2.38-2.73	2.33-2.73	1.5	
700	0.17-0.59	0.17-0.57	0.17-0.55	0.59-2.33	0.57-2.34	0.55-2.33	2.33-2.75	2.34-2.74	2.33-2.75		
900	0.15-0.52	0.16-0.52	0.17-0.48	0.52-2.28	0.52-2.32	0.48-2.31	2.28-2.75	2.32-2.75	2.31-2.75		
1100	0.14-0.49	0.15-0.51	0.14-0.47	0.49-2.31	0.51-2.32	0.47-2.28	2.31-2.75	2.32-2.72	2.28-2.74		
500	0.17-0.64	0.22-0.65	0.19-0.61	0.64-2.87	0.65-2.88	0.61-2.87	2.87-3.28	2.88-3.28	2.87-3.26	2.0	
700	0.16-0.60	0.15-0.61	0.17-0.56	0.60-2.82	0.61-2.82	0.56-2.83	2.82-3.33	2.82-3.30	2.83-3.32		
900	0.15-0.53	0.17-0.51	0.15-0.49	0.53-2.82	0.51-2.83	0.49-2.80	2.86-3.32	2.83-3.32	2.80-3.26		
1100	0.16-0.49	0.18-0.48	0.17-0.47	0.49-2.81	0.48-2.81	0.47-2.79	2.81-3.32	2.81-3.32	2.79-3.32		

**Table S4.** Time values for each phase for nozzle with 150  $\mu\text{m}$ 

P <sub>inj</sub> (bar)	Time value (s)									ET (ms)	T <sub>f</sub> (°C)
	Needle lift			Holding injection			Needle closure				
	Diesel	HVO	GtL	Diesel	HVO	GtL	Diesel	HVO	GtL		
500	0.18-0.65	0.17-0.67	0.17-0.59	0.65-1.87	0.67-1.82	0.59-1.88	1.87-2.19	1.82-2.19	1.88-2.16	1.0	20
700	0.16-0.55	0.18-0.54	0.16-0.58	0.55-1.81	0.54-1.82	0.58-1.83	1.81-2.31	1.82-2.32	1.83-2.31		
900	0.15-0.49	0.18-0.49	0.16-0.48	0.49-1.80	0.49-1.75	0.48-1.74	1.80-2.32	1.72-2.32	1.74-2.32		
1100	0.14-0.49	0.15-0.49	0.16-0.47	0.49-1.77	0.49-1.78	0.47-1.78	1.77-2.32	1.78-2.30	1.78-2.32		
500	0.19-0.61	0.18-0.69	0.19-0.60	0.61-2.39	0.69-2.37	0.60-2.37	2.39-2.73	2.37-2.73	2.37-2.73	1.5	
700	0.17-0.59	0.16-0.56	0.17-0.58	0.59-2.34	0.56-2.32	0.58-2.32	2.34-2.75	2.32-2.76	2.32-2.73		
900	0.16-0.53	0.16-0.51	0.16-0.49	0.53-2.32	0.51-2.31	0.49-2.33	2.32-2.75	2.31-2.73	2.33-2.72		
1100	0.14-0.49	0.18-0.49	0.16-0.49	0.49-2.31	0.49-2.30	0.49-2.29	2.31-2.75	2.30-2.75	2.29-2.73		
500	0.18-0.63	0.19-0.68	0.19-0.61	0.63-2.88	0.68-2.86	0.61-2.89	2.88-3.28	2.86-3.27	2.89-3.26	2.0	
700	0.16-0.59	0.17-0.55	0.17-0.56	0.59-2.82	0.55-2.84	0.56-2.82	2.82-3.33	2.84-3.32	2.82-3.33		
900	0.16-0.53	0.15-0.53	0.15-0.49	0.53-2.83	0.53-2.81	0.49-2.79	2.83-3.32	2.81-3.31	2.79-3.30		
1100	0.16-0.49	0.15-0.48	0.14-0.47	0.49-2.81	0.48-2.80	0.47-2.80	2.81-3.32	2.80-3.30	2.80-3.32		
500	0.17-0.64	0.20-0.63	0.19-0.62	0.64-1.87	0.63-1.86	0.62-1.87	1.87-2.19	1.86-2.19	1.87-2.16	1.0	40
700	0.16-0.55	0.17-0.56	0.18-0.52	0.55-1.80	0.56-1.83	0.52-1.83	1.80-2.31	1.83-2.31	1.83-2.31		
900	0.15-0.50	0.15-0.49	0.16-0.50	0.50-1.76	0.49-1.80	0.50-1.79	1.76-2.32	1.80-2.32	1.79-2.31		
1100	0.16-0.51	0.15-0.49	0.15-0.47	0.51-1.79	0.49-1.78	0.47-1.74	1.79-2.32	1.78-2.31	1.74-2.30		
500	0.17-0.63	0.22-0.66	0.18-0.57	0.63-2.37	0.66-2.38	0.57-2.33	2.37-2.73	2.38-2.73	2.33-2.73	1.5	
700	0.17-0.59	0.17-0.57	0.17-0.55	0.59-2.33	0.57-2.34	0.55-2.33	2.33-2.75	2.34-2.74	2.33-2.75		
900	0.15-0.52	0.16-0.52	0.17-0.48	0.52-2.28	0.52-2.32	0.48-2.31	2.28-2.75	2.32-2.75	2.31-2.75		
1100	0.14-0.49	0.15-0.51	0.14-0.47	0.49-2.31	0.51-2.32	0.47-2.28	2.31-2.75	2.32-2.72	2.28-2.74		
500	0.17-0.64	0.22-0.65	0.19-0.61	0.64-2.87	0.65-2.88	0.61-2.87	2.87-3.28	2.88-3.28	2.87-3.26	2.0	
700	0.16-0.60	0.15-0.61	0.17-0.56	0.60-2.82	0.61-2.82	0.56-2.83	2.82-3.33	2.82-3.30	2.83-3.32		
900	0.15-0.53	0.17-0.51	0.15-0.49	0.53-2.82	0.51-2.83	0.49-2.80	2.86-3.32	2.83-3.32	2.80-3.26		
1100	0.16-0.49	0.18-0.48	0.17-0.47	0.49-2.81	0.48-2.81	0.47-2.79	2.81-3.32	2.81-3.32	2.79-3.32		