

Supplement of:

Assessing the climate mitigation potential of targeted SAF use in 2030 at Copenhagen Airport

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S1 SAF in all flights

Table S1. EAGWP100-based CO2e for all flights departing from CPH in the 2030 scenario for use of conventional jet fuel, SAF blends with 6%, 30%, 40%, 50%, 60% and 70% as well as for 100% SAF, respectively, in all flights. Note that rounding can lead to apparent errors in the sum of individual species with respect to total.

SAF share in all flights ex CPH	CO2e(EAGWP100) / Mt						
	Total	CO ₂	H ₂ O	O ₃	CH ₄	CiC	PMO
0%	4.86	2.20	0.28	1.51	-0.36	1.34	-0.10
6%	4.73	2.10	0.28	1.51	-0.36	1.31	-0.10
30%	4.15	1.67	0.28	1.51	-0.36	1.15	-0.10
40%	3.90	1.50	0.28	1.51	-0.36	1.07	-0.10
50%	3.65	1.32	0.28	1.51	-0.36	1.00	-0.10
60%	3.41	1.14	0.28	1.51	-0.36	0.93	-0.10
70%	3.17	0.97	0.28	1.51	-0.36	0.87	-0.10
100%	2.50	0.44	0.28	1.51	-0.36	0.73	-0.10

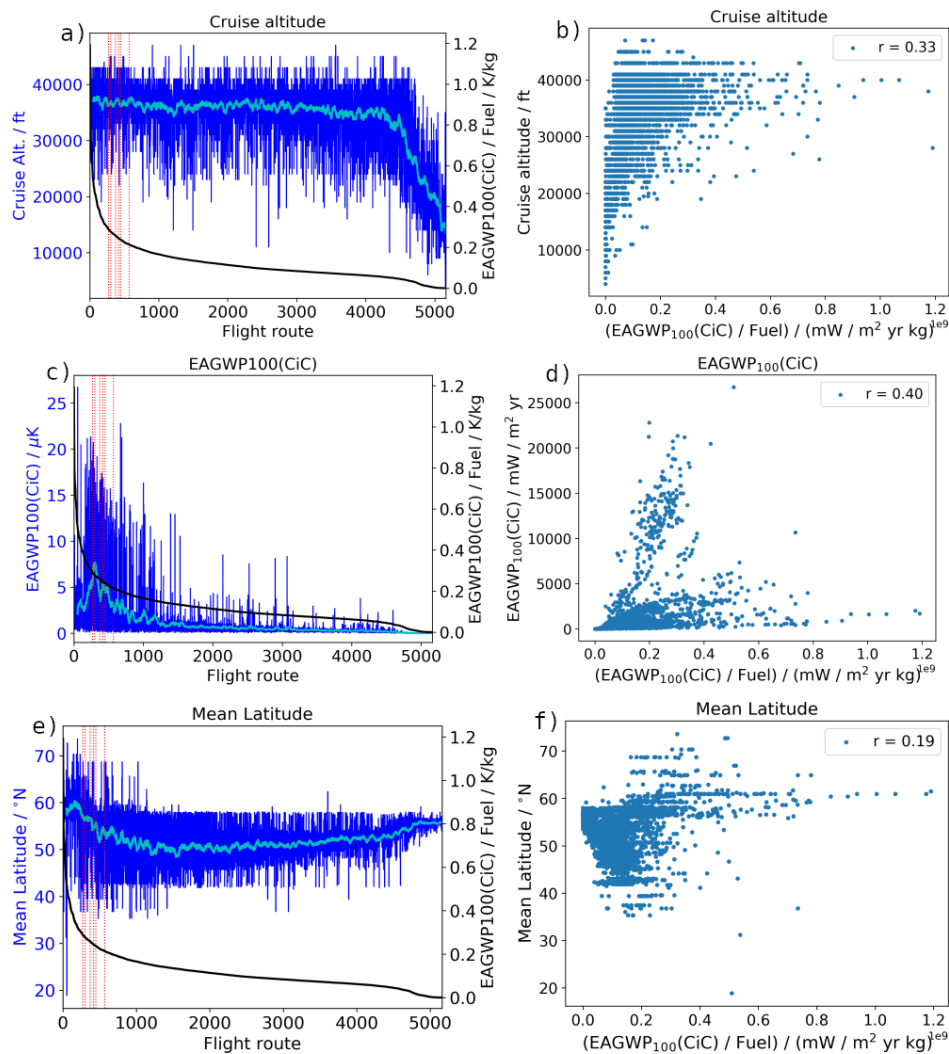


Figure S1. Time series (left) and scatter plot (right) for the 5160 flight routes ex CPH of EAGWP100(CiC)/Fuel with cruise altitude (a,b), EAGWP100(CiC) (c,d) and mean latitude (e,f), respectively. The vertical red dashed lines in the time series plots mark the limit for flight routes with SAF amounts of 30%, 40%, 50%, 60%, 70% and 100% and the cyan lines depict a moving average over 50 flight routes. The r values in the scatter plots present the Pearson correlation coefficient.

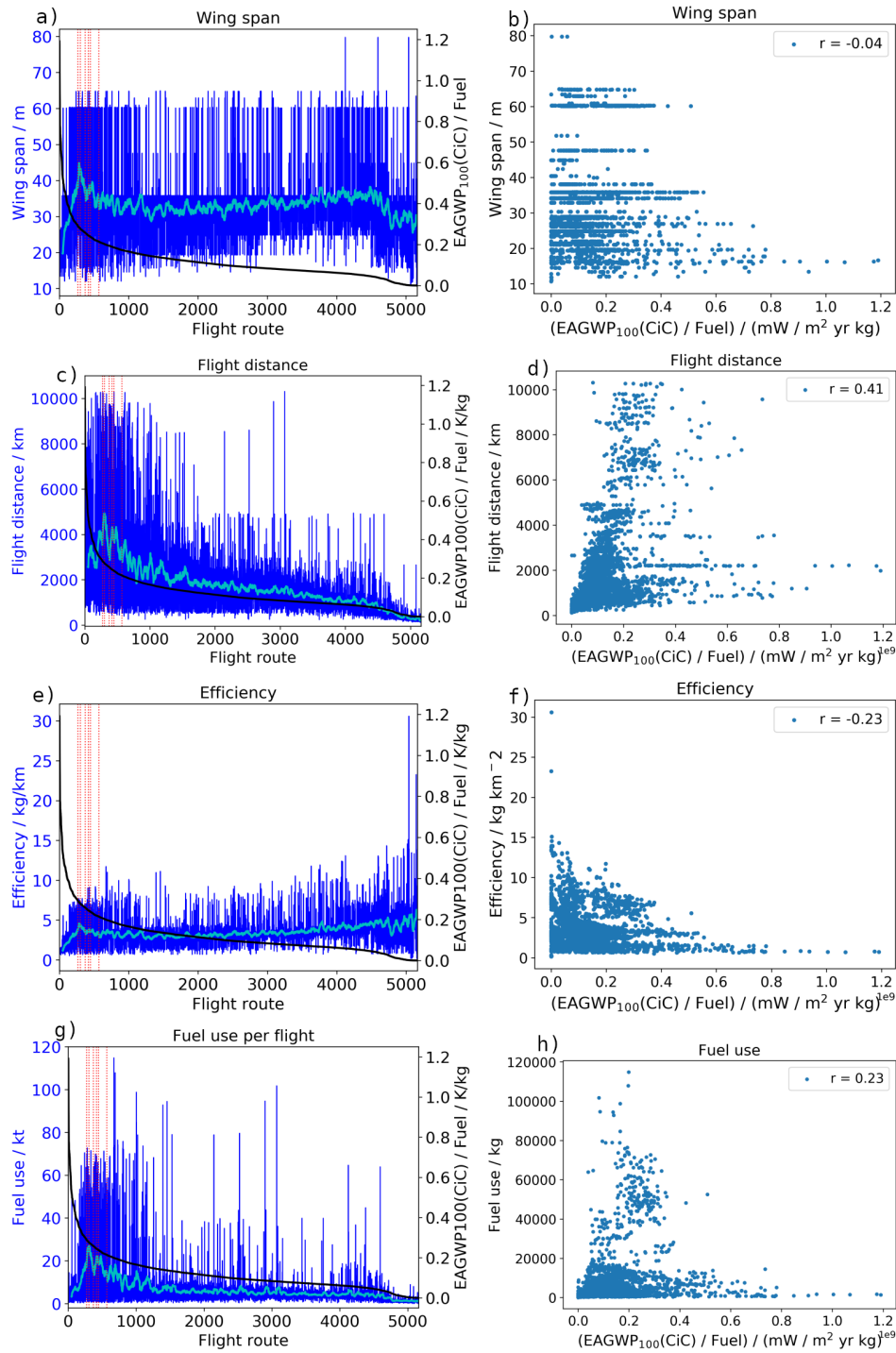


Figure S2. As Fig. S1 but for wing span (a,b), flight distance (c,d), efficiency (e,f) and fuel use (g,h).

S3 Climate benefit

Table S2. CO₂e reduction relative to complete CO₂e for CiC, CO₂ and the sum (total) through SAF use with different blending ratios on selected flights for different climate metrics and time horizons. As the same total amount of SAF is available in all scenarios (6%), the larger the SAF amounts, the fewer flights are tanked with SAF. *For the 6% SAF blending ratio, SAF is uniformly distributed to all flights. Flight selection is according to the contrail to fuel use ratio, for more information see main text.

SAF amount / %	6*	30	40	50	60	70	100
EAGWP100							
Total / %	-2.75	-3.66	-3.84	-3.93	-4.00	-4.03	-3.95
CiC / %	-0.58	-1.49	-1.67	-1.76	-1.83	-1.86	-1.78
CO ₂ / %	-2.17	-2.17	-2.17	-2.17	-2.17	-2.17	-2.17
EAGWP50							
Total / %	-2.35	-3.43	-3.66	-3.76	-3.84	-3.88	-3.78
CiC / %	-0.70	-1.78	-2.00	-2.11	-2.19	-2.23	-2.13
CO ₂ / %	-1.65	-1.65	-1.65	-1.65	-1.65	-1.65	-1.65
EAGWP20							
Total / %	-1.83	-3.12	-3.38	-3.51	-3.61	-3.65	-3.53
CiC / %	-0.83	-2.12	-2.39	-2.52	-2.61	-2.65	-2.54
CO ₂ / %	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
AGWP100							
Total / %	-2.57	-4.26	-4.60	-4.77	-4.90	-4.95	-4.80
CiC / %	-1.08	-2.77	-3.11	-3.28	-3.40	-3.46	-3.31
CO ₂ / %	-1.49	-1.49	-1.49	-1.49	-1.49	-1.49	-1.49
ATR100							
Total / %	-2.66	-3.61	-3.80	-3.89	-3.97	-3.99	-3.91
CiC / %	-0.61	-1.55	-1.75	-1.84	-1.91	-1.94	-1.86
CO ₂ / %	-2.06	-2.06	-2.05	-2.05	-2.06	-2.05	-2.05

Table S3. As table S2 but for absolute CO2e reduction.

SAF amount / %	6*	30	40	50	60	70	100
	EAGWP100						
Total / kt	-133.9	-178.0	-187.0	-191.4	-194.7	-196.0	-192.1
CiC / kt	-28.3	-72.4	-81.4	-85.8	-89.1	-90.5	-86.5
CO ₂ / kt	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6
	EAGWP50						
Total / kt	-150.2	-219.6	-233.8	-240.7	-245.9	-248.0	-241.8
CiC / kt	-44.5	-113.9	-128.2	-135.1	-140.2	-142.5	-136.3
CO ₂ / kt	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6
	EAGWP20						
Total / kt	-193.7	-330.9	-359.0	-372.6	-382.9	-387.2	-374.9
CiC / kt	-88.0	-225.2	-253.4	-267.0	-277.2	-281.6	-269.3
CO ₂ / kt	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6
	AGWP100						
Total / kt	-182.1	-301.3	-325.7	-337.5	-346.5	-350.2	-339.6
CiC / kt	-76.5	-195.6	-220.1	-231.9	-240.8	-244.6	-234.0
CO ₂ / kt	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6
	ATR100						
Total / kt	-136.8	-185.4	-195.3	-200.1	-203.8	-205.3	-200.9
CiC / kt	-31.2	-79.7	-89.7	-94.5	-98.1	-99.7	-95.4
CO ₂ / kt	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6	-105.6

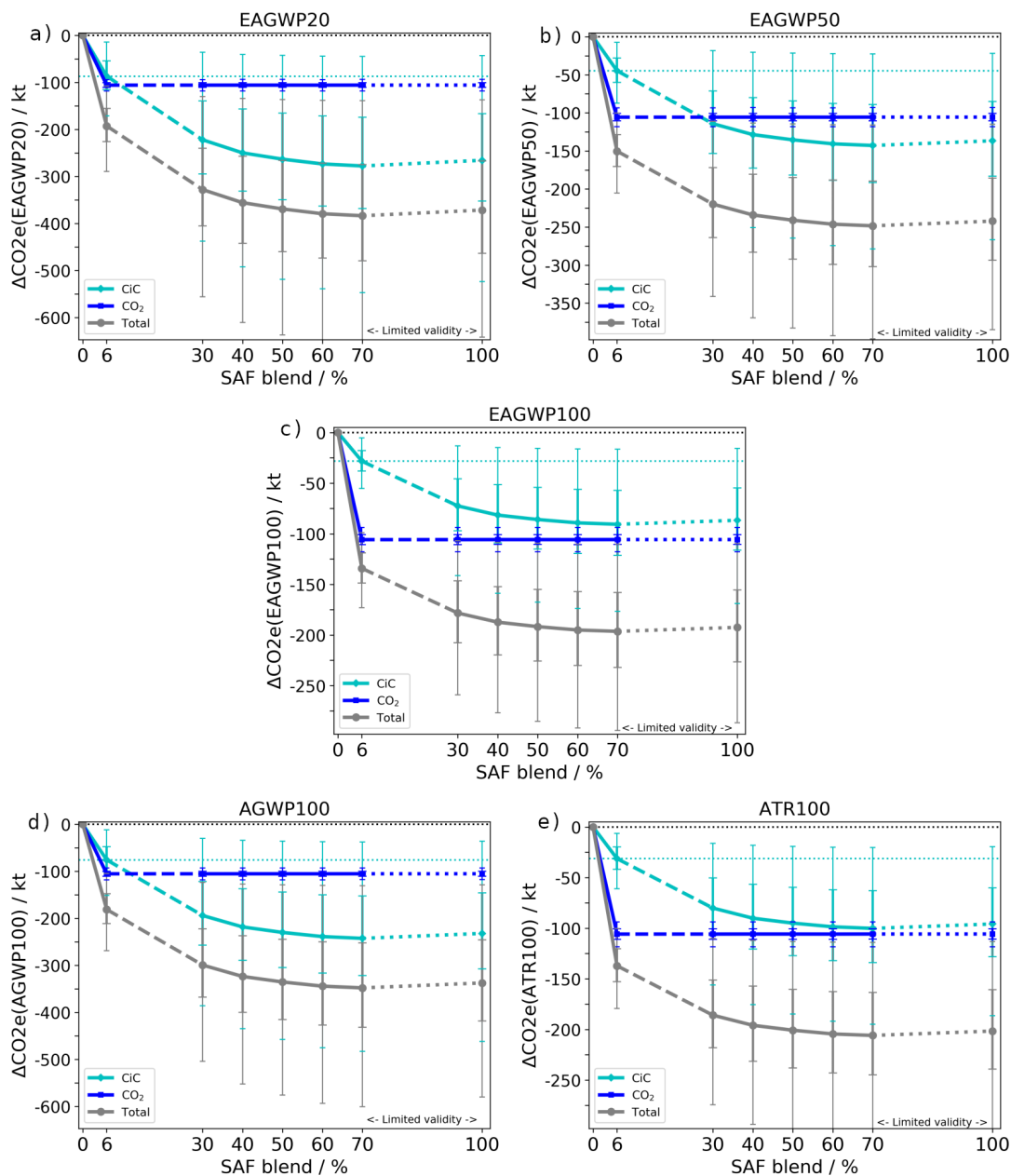


Figure S3. Fleet-wide absolute a) EAGWP20-based b) EAGWP50-based c) EAGWP100-based d) AGWP100-based e) ATR100-based CO₂e reduction for SAF use. Left part (uniform): resulting from a 6% SAF share at CPH in 2030, uniformly distributed across all flights. Right solid part: targeted SAF allocation to selected flights with blending ratios of 30%, 40%, 50%, 60% and 70% as well as with 100% SAF (dotted part of lines). The dotted cyan horizontal lines mark the CiC-based CO₂e reduction through 6% even distribution which denotes the reference for the other cases. The vertical lines display the uncertainty estimates as described in the text for the 50% and the 90% percentile ranges. The dashed part of the lines illustrates the break between uniform and targeted SAF use and the dotted parts the limited validity of the parameterisation above 73%. The numbers of the plots are provided in Tabs. S2 and S3.

Table S4. Relative total reduction for different metrics and time horizons (values to fig). *For the 6% SAF blending ratio, SAF is uniformly distributed to all flights. Flight selection is according to the contrail to fuel use ratio, for more information see main text.

SAF amount / %	6*	30	40	50	60	70	100
	Relative reduction of total						
EAGWP20 / %	-1.83	-3.12	-3.38	-3.51	-3.61	-3.65	-3.53
EAGWP50 / %	-2.35	-3.43	-3.66	-3.76	-3.84	-3.88	-3.78
EAGWP100 / %	-2.75	-3.66	-3.84	-3.93	-4.00	-4.03	-3.95
AGWP100 / %	-2.83	-4.20	-4.49	-4.62	-4.73	-4.77	-4.65
ATR100 / %	-2.66	-3.61	-3.8	-3.89	-3.97	-3.99	-3.91
	Absolute reduction of total						
EAGWP20 / kt	-193.7	-330.9	-359.0	-372.6	-382.9	-387.2	-374.9
EAGWP50 / kt	-150.2	-219.6	-233.8	-240.7	-245.9	-248.0	-241.8
EAGWP100 / kt	-133.9	-178.0	-187.0	-191.4	-194.7	-196.0	-192.1
AGWP100 / kt	-153.7	-228.7	-244.0	-251.4	-257.1	-259.4	-252.7
ATR100 / kt	-136.8	-185.4	-195.3	-200.1	-203.8	-205.3	-200.9

Table S5. Ratio on CO₂ and CiC CO₂e reduction for different metrics and time horizons (values to fig). *For the 6% SAF blending ratio, SAF is uniformly distributed to all flights. Flight selection is according to the contrail to fuel use ratio, for more information see main text.

SAF amount / %	6*	30	40	50	60	70	100
	CiC ratio on CO₂e reduction						
EAGWP20 / %	45.5	68.1	70.6	71.7	72.4	72.7	71.8
EAGWP50 / %	29.7	51.9	54.8	56.1	57.0	57.4	56.3
EAGWP100 / %	21.1	40.7	43.5	44.8	45.7	46.1	45.0
AGWP100 / %	31.3	53.8	56.7	58.0	58.9	59.3	58.2
ATR100 / %	22.8	43.0	45.9	47.2	48.2	48.6	47.5
	CO₂ ratio on CO₂e reduction						
EAGWP20 / %	54.5	31.9	29.4	28.3	27.6	27.3	28.2
EAGWP50 / %	70.3	48.1	45.2	43.9	43.0	42.6	43.7
EAGWP100 / %	78.9	59.3	56.5	55.2	54.3	53.9	55.0
AGWP100 / %	68.7	46.2	43.3	42.0	41.1	40.7	41.8
ATR100 / %	77.2	57.0	54.1	52.8	51.8	51.4	52.5