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The table of contents is presented on a white background with a large, light blue graphic of an aircraft wing and tail. The 748 Air Services logo and website "www.748airservices.com" are located at the bottom right of the page.

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Background information

The 2007 IPCC assessment report (AR4) finds that total aviation CO₂ emissions (domestic and international) are approximately 2% of the world's anthropogenic (human-made) CO₂ emissions.

Seven Four Air Services (K) Ltd developed a carbon emissions Plan in 2019 which was approved by the KCAA after it volunteered to participate in ICAO CORSIA program. Ever since, we have actively been monitoring our carbon emission and looking into ways to be more fuel efficient and reduce our carbon footprint in our operations

On its environmental sustainability program issued on May 2021, the WFP elected to engage stakeholders (technical and operational) to define and implement its future environmental strategy .

It is on this basis that Seven Four Air Services (K) Ltd was selected to participate in an operational measures case study that is designed to find opportunities within their operations to reduce fuel burn and carbon emissions based on ICAO DOC 10013 and industry practices.



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Objectives

To identify and implement pragmatic fuel efficiency practices and procedures that consider the environment and reduce carbon emissions.



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Scope

- The program covered a 3 month period from 15th November 2021 to 15th Feb 2022.
- Data collection covered flights of a Dash 8-106 aircraft of registration 5Y-IHO operating in Kenya and Somalia.

It involved collection of the actual fuel data points captured in six distinct phases of the flights.

The data presented is based upon 130 Sectors conducted by the Dash 8-106 (5Y-IHO)



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Determination of Methodology

Seven Four Air Services (K) Ltd has identified the following areas where significant carbon emissions reductions potentially can be achieved:

- Continuous climb operations(CCO),
- Continuous descent operations(CDO),
- Cruise flight with en-route winds.
- Optimum altitude with en-route winds.

A flight planning app **ForeFlight** (a product of Boeing) was utilized as a tool to guide this achievement.

This application has a detailed aircraft performance profiles and a global winds real time module as well as a route advisor.



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Determination of Methodology Cont...

This app provides the organization data on the optimum fuel efficient altitude and route(s) to fly.

The aircraft operating data manual (ODM) has a Minimum Block Fuel Technique chart that lists the lowest possible fuel burns.

Example: at a sector distance of 200 NM at ISA +20 the optimum altitude is 20,000 feet and the fuel burn 989 lbs, Minimum block fuel technique comprises the following:

- a) CLIMB – Type 2 -160 knots (Intermediate Speed); 1,050 RPM.
- b) CRUISE – LRC – (Long Range Cruise); 900 RPM.
- c) DESCENT – Type 3 (Low speed); 900 RPM, 300 or 500 FPM.



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Data collection and analysis methods

Fuel tracking log form was developed to allow the crew to manually input the six fuel data points required for the study.



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Data collection and analysis methods con't...

The information obtained from the fuel tracking log is reviewed and updated on to the Master fuel tracking log.

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FUEL USED (lbs)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
	Alt	Date	From	To	Spit	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt	Wt
1	4600	4499	4043																										
2	3273	3227	2727																										
3	4700	4595	3998																										
4	4800	4757	4446																										
5	3997	3935	3432																										
6	5300	5241	4740																										
7	4800	4709	4304																										
8	4800	4745	4070																										
9	3030	2948	2640																										
10	4700	4645	4088																										
11	4800	4723	4181																										

Sample of the Master fuel tracking log



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Data collection and analysis methods con't...

H	I	J	K	L	M	N	O	P
START FUEL	TAKE OFF FUEL	TOP OF CLIMB FUEL	ACTUAL IGT LEVEL	TOP OF DESCENT	LANDING FUEL	SHUTDOWN FUEL	FUEL USED (kgs)	FUEL USED (lbs)
4600	4499	4043		3559	3288	3273	601.917791	1327
3273	3227	2727		2290	2012	1994	580.145331	1279
4700	4595	3998		2621	2396	2377	1053.69633	2323
4800	4757	4446		4120	4010	3997	364.235106	803
3997	3935	3432		2461	2265	2171	828.260653	1826
5300	5241	4740		2959	2855	2797	1135.34305	2503
4800	4709	4304		2246	1986	1955	1290.47183	2845
4800	4745	4070		3240	3058	3036	800.137892	1764
3030	2948	2640		2374	2169	2152	398.254574	878
4700	4645	4088		2852	2645	2623	942.112473	2077
4800	4723	4181		2757	2548	2522	1033.28465	2278



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Implementation

A project leader was identified to oversee the execution of the study. It encompassed joint ground and air elements.

The flight crew and dispatchers were briefed on their responsibilities of mission profiles and collection of data methods during the test period.

The data collected were entered daily, reviewed weekly and reported monthly to the WFP.



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SUMMARY 5Y-IHO AVERAGES NOV 15 TO DEC 15

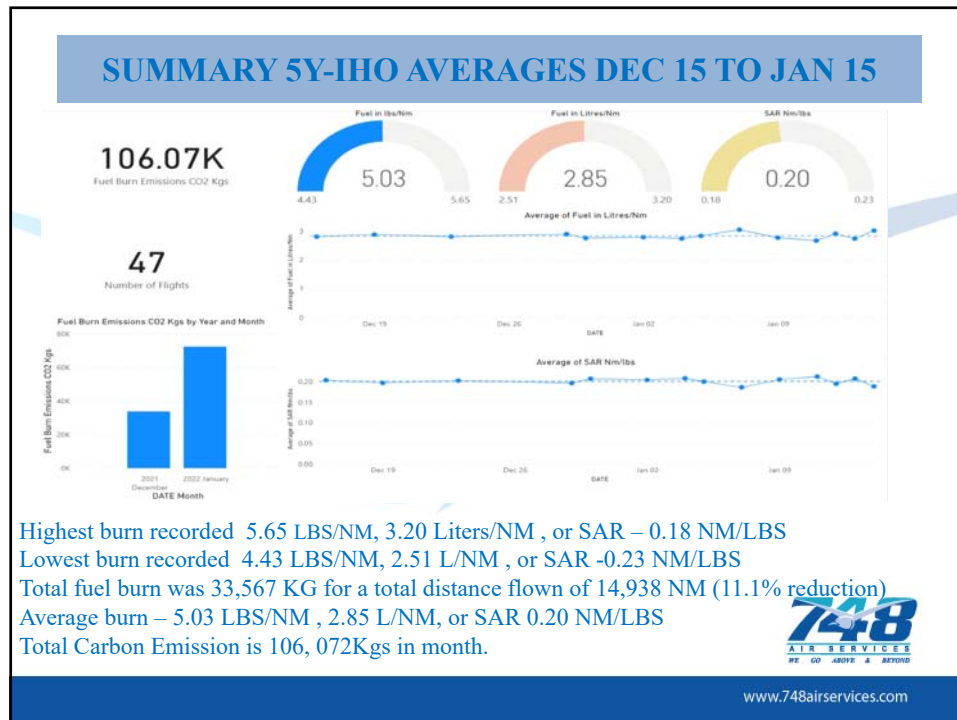


Highest burn recorded 8.68LBS/NM, 4.92 Liters/NM, or SAR 0.12NM/LBS
 Lowest burn recorded 3.91 LBS/NM, 2.22 L/NM, or SAR 0.26 NM/LBS
 Total fuel burn was 24,052 KG for a total distance flown of 10,136 NM
 Average burn 5.66 LBS/NM, 3.21 L/NM, or SAR 0.18 NM/LBS
 Total Carbon Emission is 76,005Kgs for month.

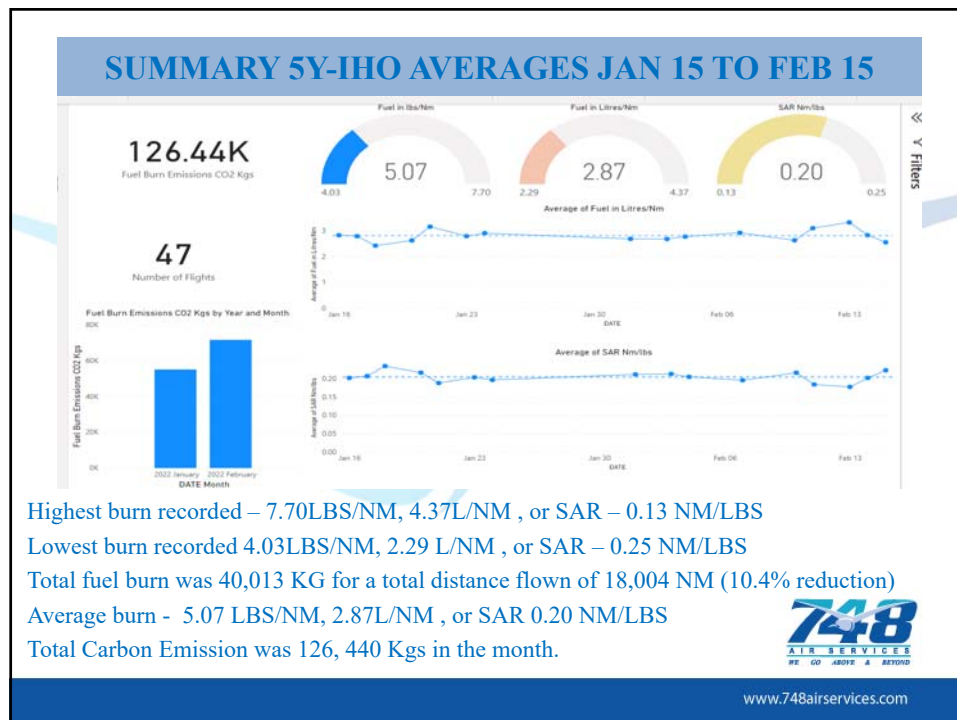


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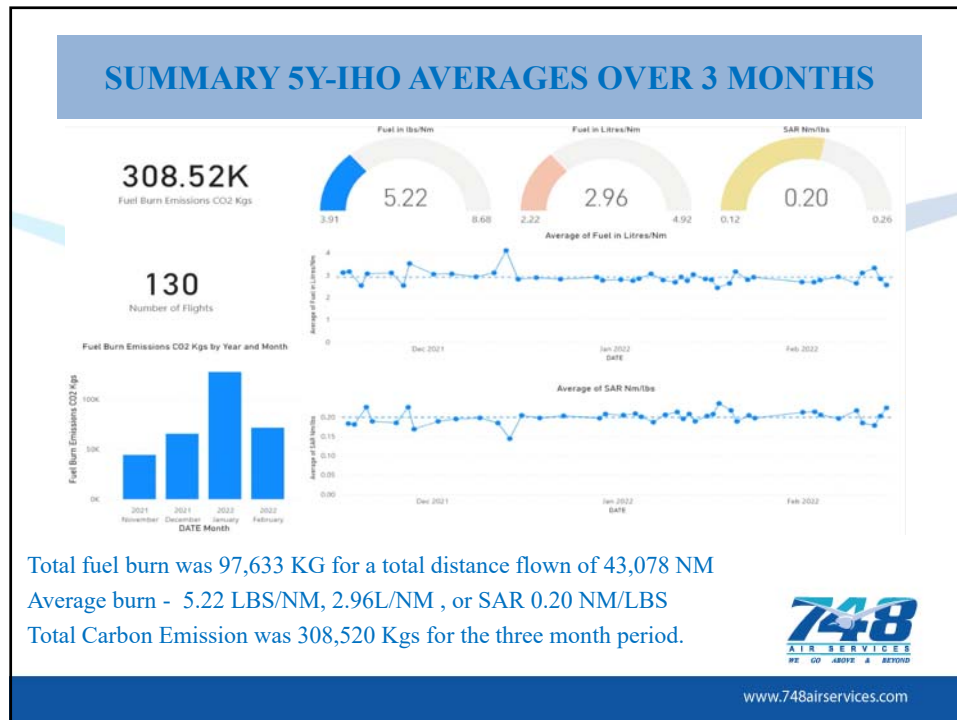
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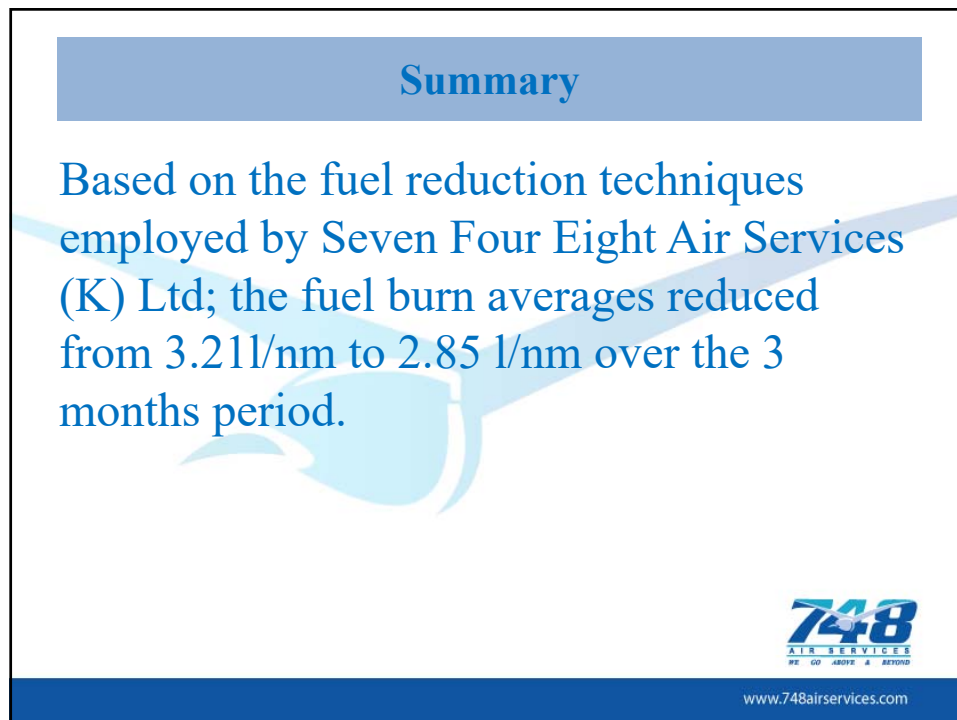
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Challenges

- Operation in Mogadishu airport is challenging due to traffic congestion causing delays in departures by 30 minutes or more on ground with engines running and delay in arrivals by unplanned holdings due to traffic.
- Operating according to special routes into Mogadishu airspace at times keeps the aircraft away from the intended track due to security concerns / reasons increasing the overall flight time and increasing fuel burn.
- At certain times due to weather , the optimum altitude cannot be achieved.
- Delays in ATC departure and arrival procedures.
- Challenges associated with flight planning due to unreliable and/or outdated weather information.
- Challenges in flight planning due to unreliable internet connectivity in remote airfields.



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Data Limitations

- Fuel data improves on long range flights, however, routings during this period were limited to short and medium range 38nm to 563nm.
- Data excluded in this study is repositioning flights.



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Conclusion

The pragmatic fuel efficiency practices and procedures implemented in this 3 month operational case study are destined to become the basis of an automated fuel efficiency/ carbon reduction program in future.

Lessons learnt

We at 748 air services have decided to roll out all the lessons learned and future technologies across our entire fleet.

We are looking at alternative engine technologies that are based upon hydrogen and electric-hybrid technology.

We are watching the bio fuel industry and its development of Sustainable Aviation Fuels (SAF) which are currently approved at 50:50 mixture with Jet A1.

We are actively involved with Pratt and Whitney and Dehaviland in discussions as we await the bio-fuels technology availability and pricing to be viable.

The end



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