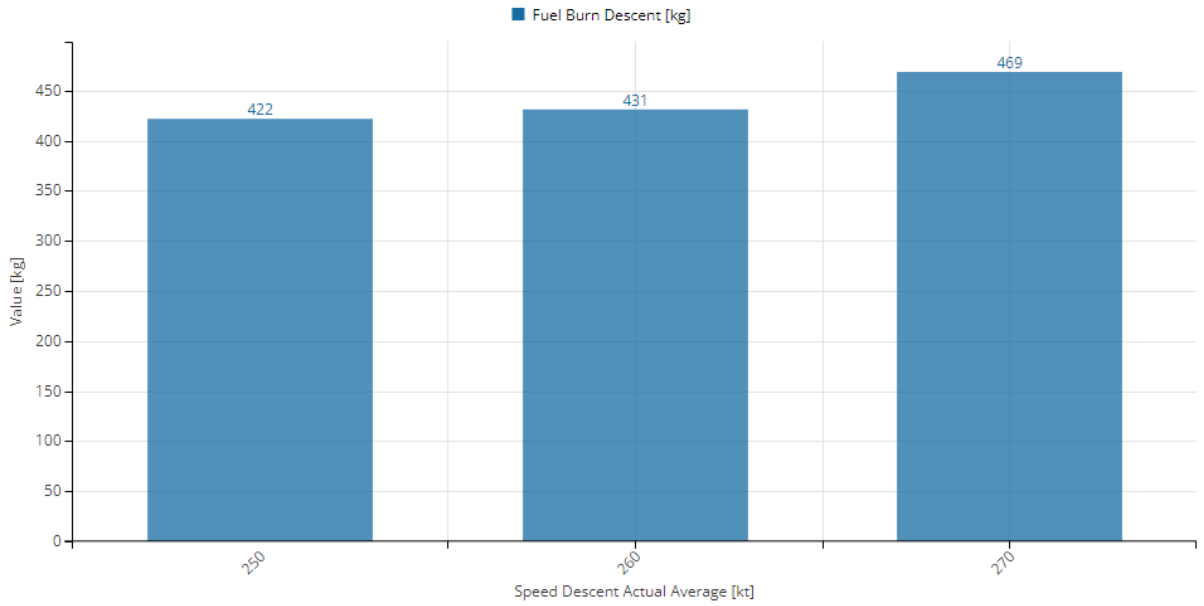
FABEC VFE WORKSHOP 2021

December 7th, 2021

FUEL EFFICIENCY INITIATIVES
DESCENT OPTIMSATION - SPEED

DESCENT SPEEDS

- **ECON speeds** for A320 with FMS2 **cannot be below 270kts** - this constrain is not related to performance.
- Wizz Air applies in-house derived descent ECON speeds.
- Based on actual observations on mostly unrestricted airports, average savings of **120kg of CO2** can be achieved.

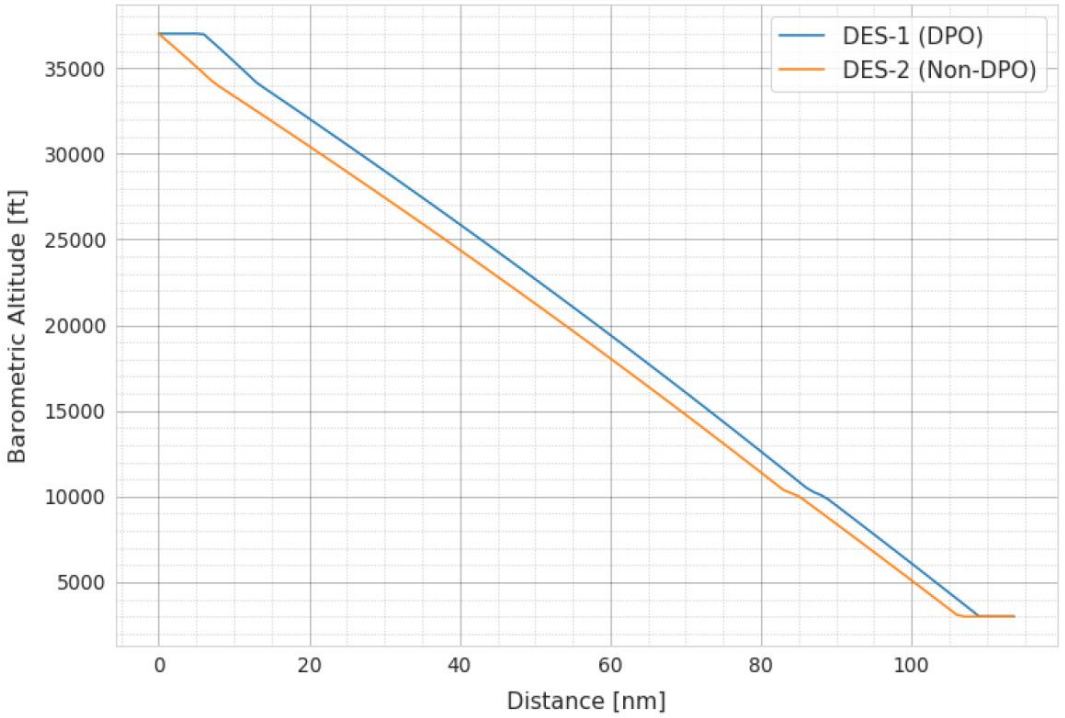


Actual Average Fuel Burn During Descent A320CEO Sharklets ~60t GW

FUEL EFFICIENCY INITIATIVES
DESCENT OPTIMISATION - DPO

DESCRIPTION

- Typical descent to **busy airports** will consist mostly of **geometrical segments** and rarely of idle segments.
- Typical descent to **airports without restrictions** will include **idle segments only**.
- At the end of the descent, **FMS calculates the deceleration segment**, which allows aircraft to decelerate for the final approach.
- FMS uses Performance Database in order to compute the vertical profile - the drag polar, idle thrust data, and correcting functions.
- Performance Database **includes Idle Thrust Delta** – an artificial idle thrust increment that makes the **descent profile more conservative and easier to meet**.
- Actual descent performance of an aircraft with idle thrust does not depend on FMS-DPO modification.



FUEL EFFICIENCY INITIATIVES
DESCENT OPTIMISATION - DPO

FMS MODIFICATION

List of items modified in DPO equipped FMS:

- **Idle Thrust Delta is removed**
- **Deceleration segment distance increment is removed**

The Descent profile calculated by the FMS with DPO is equal to the standard descent profile calculated in Performance Engineer's Programs.

PROFILE DIFFERENCES

There are two differences between DPO and non-DPO profiles:

- Descent gradient – DPO profile is approximately **0.1 degrees steeper**.
- Length of deceleration segment – DPO profile deceleration is **2.4 NM shorter.**

As a result, the **top-of-descent** position for DPO equipped aircraft is **6 NM after the top-of-descent of non-DPO** FMS.

FUEL EFFICIENCY INITIATIVES

DESCENT OPTIMISATION - DPO

OBSERVED RESULTS

FMS modification - Descent Profile Optimization can deliver from **70 to 100 kg of CO2 saving** if:

- fully unrestricted sector, meaning **idle segments only**
- **proper autopilot modes** are used during full length of the descent

Unfortunately, these criteria are not often met, actual saving potential is largely affected by:

- **Airspace structure** and **ATC restrictions** at busy airports
- Use of **non-optimum autopilot modes**

Maximum possible saving potential of DPO depends on reference non-DPO profile (idle thrust and constant speed or idle thrust and FMS vertical profile capture with variable speed).

LIMITATIONS

On airports with high descent fuel consumption, such as LTN, LGW, FRA, EIN, the actual **DPO saving potential is marginal.**

On arrivals to BUD (mid-busy airport during trial period):

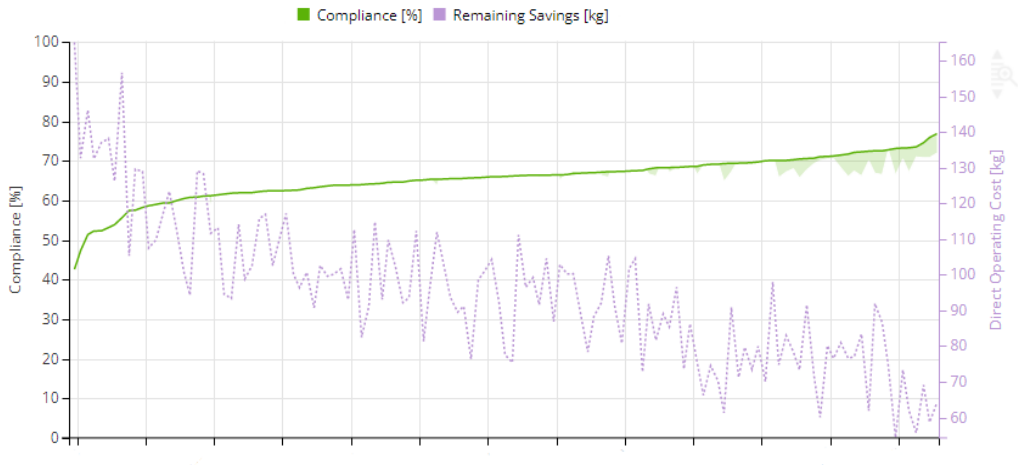
- Average actual fuel saving potential: **15 kg of CO2** per sector.
- Increased usage of recommended autopilot mode (“DES mode”) can bring additional savings.

Application of **accurate FMS Idle Factors** is key to maximize savings:

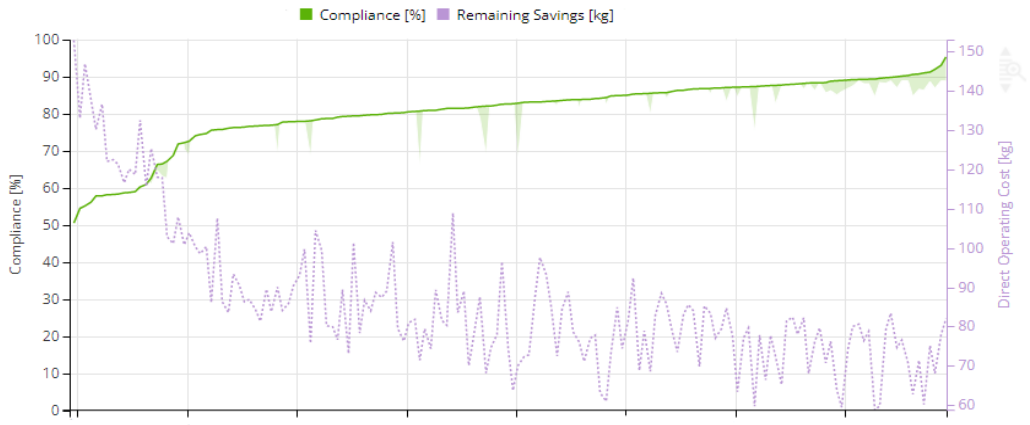
- 1% offset in idle factor results in 7 kg fuel burn penalty.

FUEL EFFICIENCY INITIATIVES

DESCENT VERTICAL PROFILE COMPLIANCE



FMS Vertical Profile Compliance A321CEO



FMS Vertical Profile Compliance A321NEO

Actual descent characteristics compared to optimal altitude and speed regarding fuel efficiency for a sample flight. Optimum profile assumes idle thrust descent.