KLM Flight Academy

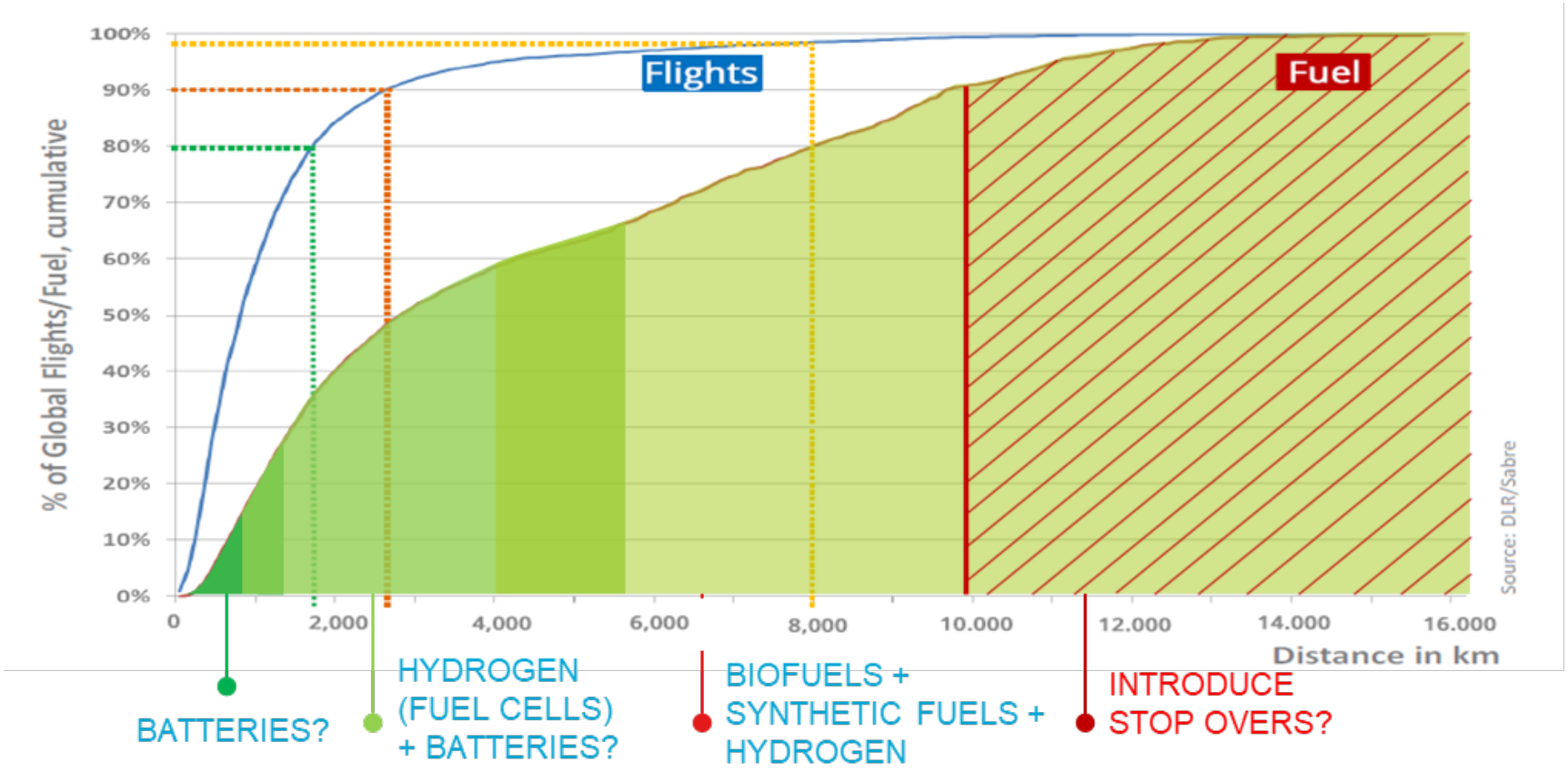
Background KLM Flight Academy

- 60 student pilots are trained each year
- Current fleet: TB-10, TB-20 and DA42
- Last year KLMFA existed 75 years; it was celebrated by looking towards the future

KLM Flight Academy

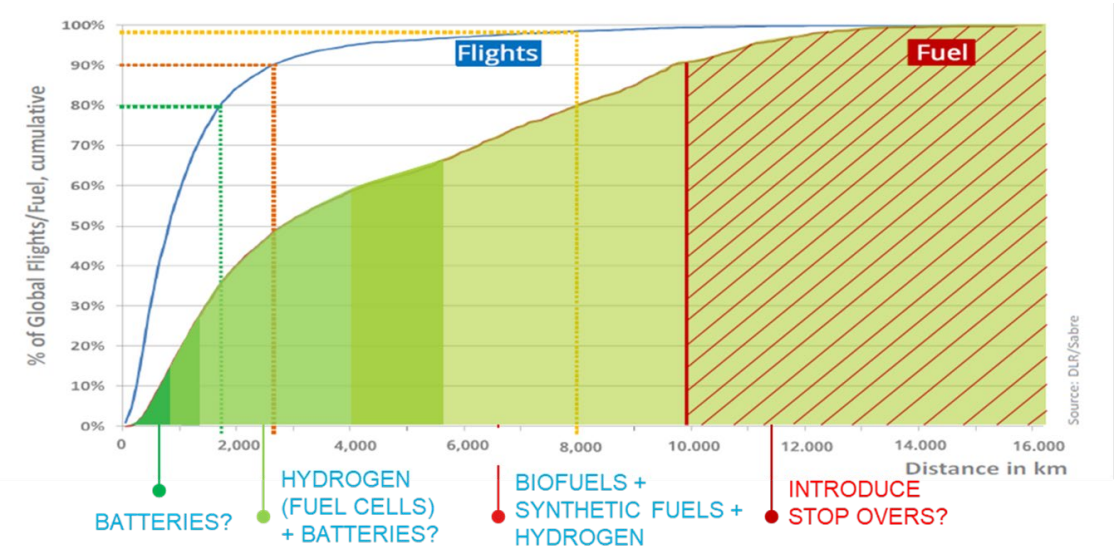
Our ambition: to become a CO2-neutral flight academy within 5 years

Electrified flight: is it possible?



The greater the distance, the greater the fuel burn → aircraft must burn fuel in order to take fuel (=weight) with them

Electrified flight: is it possible?



From this graph, it can be concluded that electrified flight is not (yet) a serious option for large distances, simply because batteries contain less energy/kg than Jet A1. Electric powered aircraft are thus limited on their range

However, for short flights, electrified flight is in fact possible

Current Fleet Usage

9 TB-10 Aircraft

± 4100 flight hours/year

= 155.000 Litres AVGAS/Year

4 TB-20 Aircraft:

± 1100 flight hours/year

= 67.000 Litres AVGAS/Year

3 DA-42 Aircraft:

± 4000 flight hours/year

= 197.000 Litres Jet A1/Year

Only one electrical aircraft is certified today

Range is too small for KLM Flight Academy operations

A-B FLIGHT RANGE in km (+ 30 min reserve @20 kW / 64 km)
WIND = 0

Cruise altitude [ft]	Cruise power [kW]	SOH [%]					
		100	80	60	40	20	0
1500	20	68 km	53 km	38 km	23 km	-	-
	25	62 km	49 km	35 km	22 km	-	-
	30	57 km	45 km	33 km	21 km	-	-
	35	52 km	42 km	31 km	20 km	-	-
2000	20	68 km	53 km	38 km	22 km	-	-
	25	62 km	49 km	35 km	22 km	-	-
	30	57 km	45 km	33 km	21 km	-	-
	35	53 km	42 km	31 km	20 km	-	-
4000	20	65 km	50 km	34 km	-	-	-
	25	62 km	48 km	34 km	-	-	-

Bye Aerospace - eFlyer

second generation electrical aircraft

- Typical training flight takes between 1 and 2 hours
- These aircraft have an endurance of resp. 3 hours
- Commercial Pilot License requires a 300 NM flight, which is possible with the E-flyer 4

	E-flyer 2	E-flyer 4
Range Mission	220 nm Pilot Training	350 nm Air Taxi, Cargo
Electric Motor	110 kW	200 kW
Energy Storage	220 Wh/kg at pack level	300 Wh/kg at pack level
		
FAA Certification FAR 23	**2022** Electric/Battery 2-seat **Level 1**	**2023** Electric/Battery 4-seat **Level 2**

eFlyer 4

eFlyer : 14 options secured for KLM Flight Academy

Aircraft Order and Delivery Position						
Est. Base Model Price:	*e*Flyer 2	$489,000		*e*Flyer 4	$627,000	
Aircraft Ordered:	☑ *e*Flyer 2	Volume: 6	x $5,000	☑ *e*Flyer 4	Volume: 8	x $10,000
Deposit Amount(s):	(total for 6 aircraft =) $ 30,000			(total for 8 aircraft =) 80,000		
Total Deposit:	**Total for 14 aircraft =) $ 110,000**					
Delivery Position(s):	#79, 109, 128, 204-205, 230			#22, 56-57, 79-80, 91-91, 103		

Charging Infrastructure

In the mean time

- Certification will take place in 2023 for the E-Flyer 2, in 2024 for the E-Flyer 4
- That is why we started a cooperation with E-Flight Academy, they operate electric Pipistrel aircraft → Not suitable for our own operation
- KLMFA students will have 2 familiarisation flights, instead of a flight on our TB-10 aircraft, which will lead to an immediate reduction of CO2 emissions
- Aim is to underline the importance of sustainability in our training and to gain experience

Sustainable Aviation Fuel

- Our Multi Engine fleet consists of 3 Diamond DA42 aircraft, which run on Jet A1
- KLMFA intends to operate these flights on SAF, as soon as it becomes available at Groningen Airport Eelde and other Airports

Cost impact based on current knowledge

Comparison syllabus SE-fleet/year (Current vs. Electric)

Estimated costs of E-flying roughly half of costs piston flying

Benefit:	**€223K**

Use of SAF instead of Jet A1

DA-42 conventional Jet-A1:	€203K
DA-42 SAF:	€812K
Additional costs:	**€609K**

Conclusion: This would mean that our annual costs will increase by €386K (€609K-€223K). We expect that SAF will become cheaper in the future, and thus lead to a decrease in additional costs.

THANK YOU