

Will e-flight take off in LAC?

CAPA Airline Leader Summit Latin America & Caribbean Summit

Mick Werson Chief Economist & Financial Advisory Lead NACO Netherlands Airports Consultants

Will e-flight take off in LAC?

- 1. E-flight: Introduction
- 2. Technical & Operational Perspective
- 3. Market & Financial Perspective
- 4. Implementation Perspective

Will E-flight take off in LAC? E-flight: Introduction

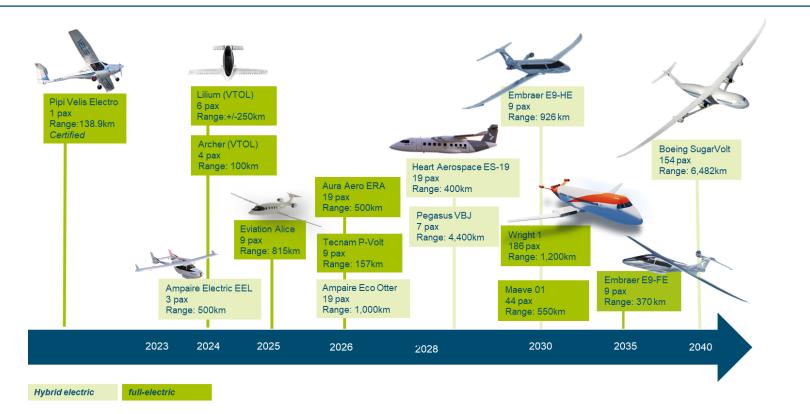
Information Classification: Genera

E-flight introduction E-flight: one of the sustainable technologies the sector is betting on



Informatiow@ashiphicatiooff@epace4] CAPA Airline Leader Summit Latin America & Caribbean Summit

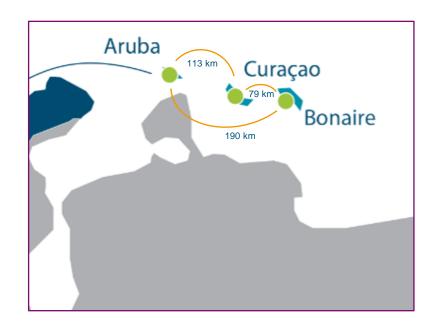
E-flight introduction The development of E-aircraft: a dynamic landscape



E-flight: introduction Besides operating existing short routes, e-flight can create new regional networks



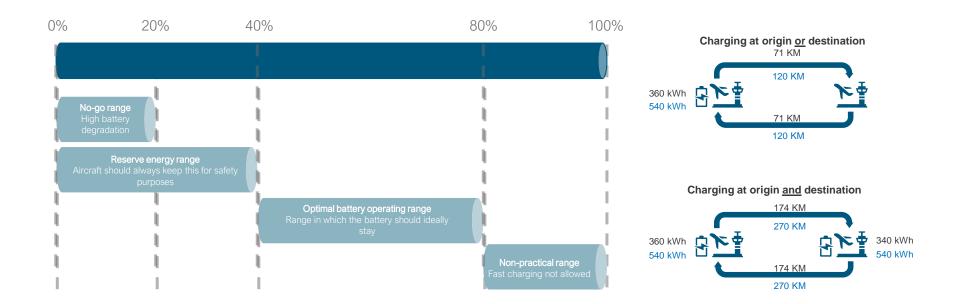
Connecting remote regions in Columbia



Connecting Dutch carribean 'ABC' islands

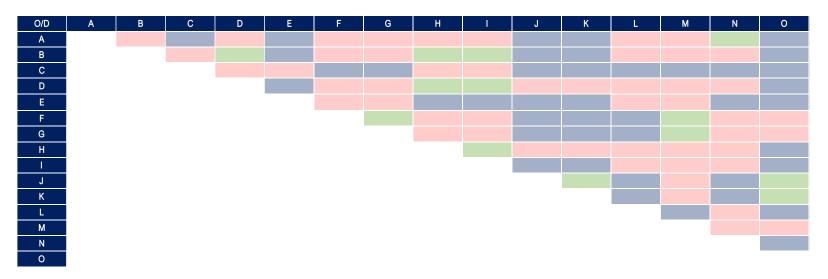
Will E-flight take off in LAC? Technical & Operational Perspective

Technical & Operational Perspective Battery capacity limits the range of e-aircraft in more than one way...



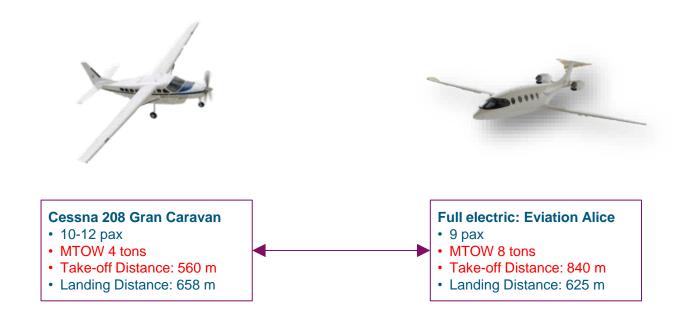
Technical & Operational Perspective ... which requires careful identification of eligble routes to start with

Example of initial assessment of possible e-flights within an airport network, based on range and recharging assumptions

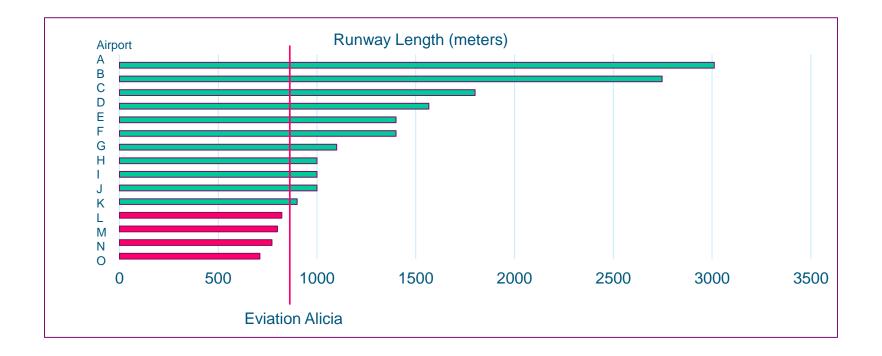


Feasible 2-way flights charging only at origin Feasible 2-way flights charging both at origin and destination Not feasible for 1st generation e-aircraft

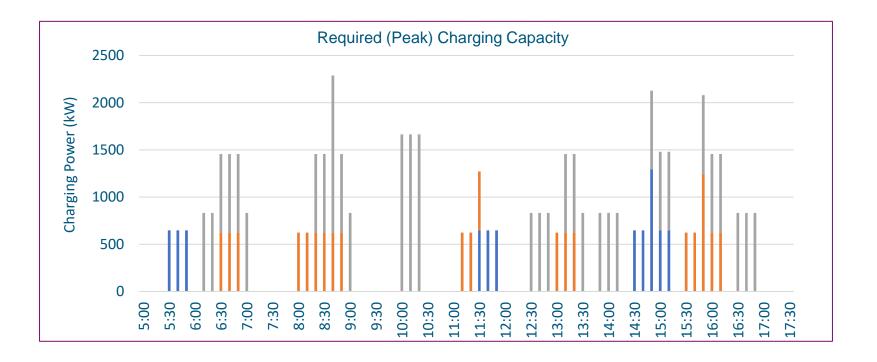
Technical & Operational Perspective Batteries make E-aircraft heavier, hence have longer landing and takeoff distances...



Technical & Operational Perspective ...which translates into runway length requirements



Technical & Operational Perspective Third, e-craft need fast charging, taking into account peak hour activity...



Technical & Operational Perspective ... which requires an assessment how to provide the required peak loads



Airport electric infrastructure (source: NRG2FLY)

Electricity productivity map

Technical & Operational Perspective

Considering all requirements, a feasibility map can be constructed to set priorities

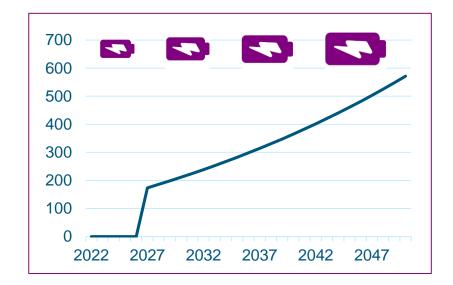




Will E-flight take off in LAC? Market & Financial Perspective

Information Classification: Genera

Market & Financial Perspective Battery technology development and investments will grow the e-flight potential...



Development maximum range Aviation Alice (km)

	Phase 1: 2026	Phase 2: 2030	Phase 3: 2035			
Solar (m2)	3000	9000	18000			
Chargers (#)	2	3	5			
Electric infra (k€)	650	900	1300			
Storage (k€)	50	150	200			
Stands (k€)	100	100	200			
Contigency (k€)	200	350	500			
Total cost (k€)	1000	1500	2200			

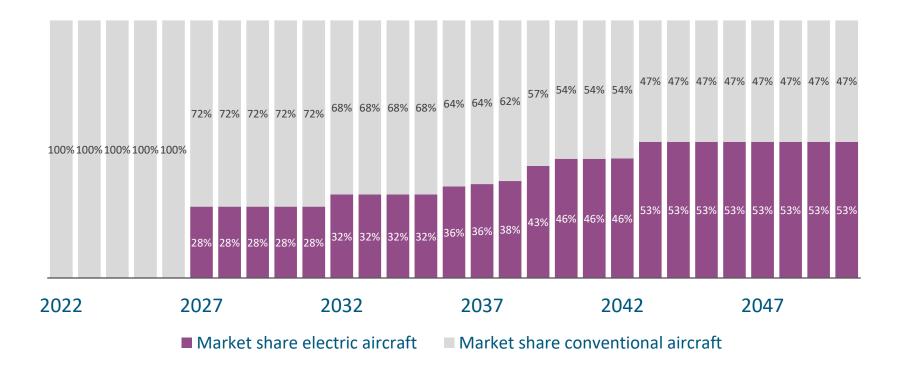
Investment plan in charging equipment

Market & Financial Perspective ... bringing more and more feasible city-pairs into play over time

City Pair	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
1														
2														
3														
4														J
5														
6														
7														
8														
9														
10														
11														
12														1
13														
14														
15														
16														
17														
18														
19														
20 21														
21														
22 23										_	_			
23														
24														
24 25 26														
20														
27 28	ļ													
29														
29 30														
31														

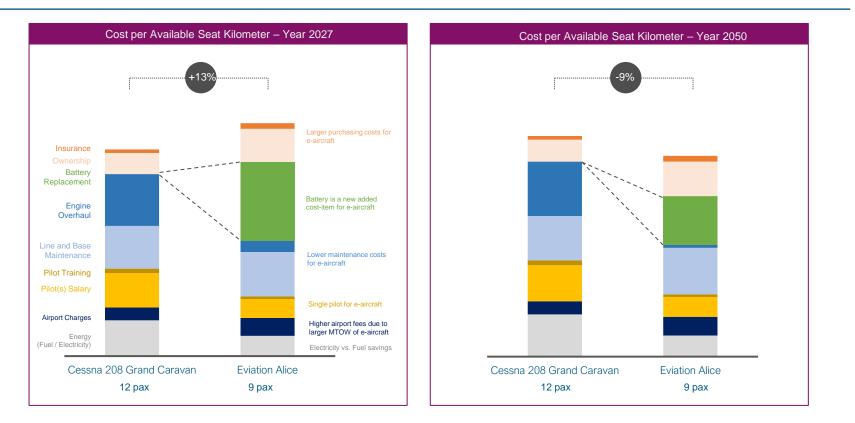
Informatiow@ballighteatiooff@ctateal/ CAPA Airline Leader Summit Latin America & Caribbean Summit

Market & Financial Perspective Weaving this in with a traffic forecast will give insight in the growth of e-flights



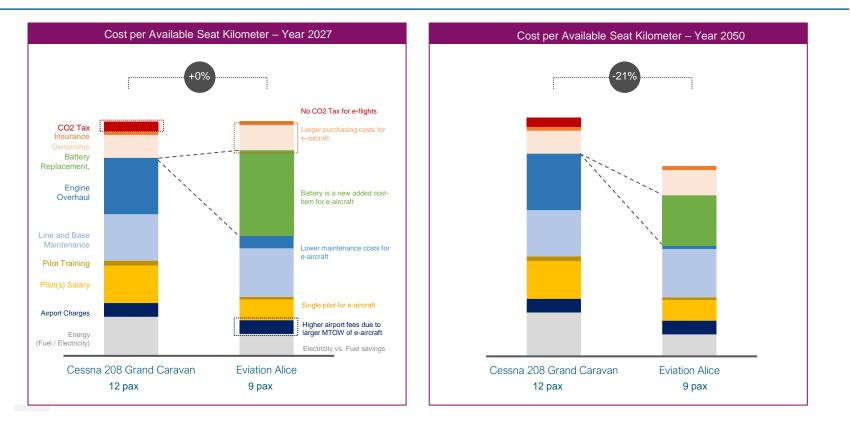
Information/III athipfication/III CAPA Airline Leader Summit Latin America & Caribbean Summit

Market & Financial Perspective E-flight will not bring airlines better route economics in the near future...



Informatiow@ashiphicatiooff@etpecal CAPA Airline Leader Summit Latin America & Caribbean Summit

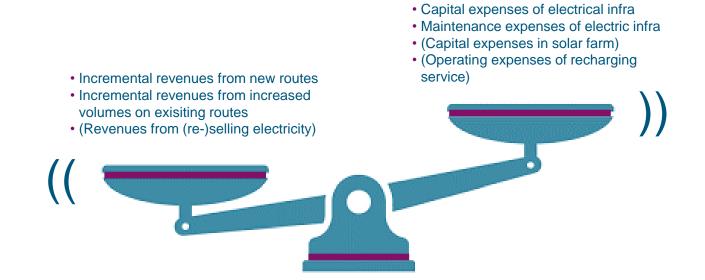
Market & Financial Perspective ... but policy makers and regulators can play a role to help e-flight take off



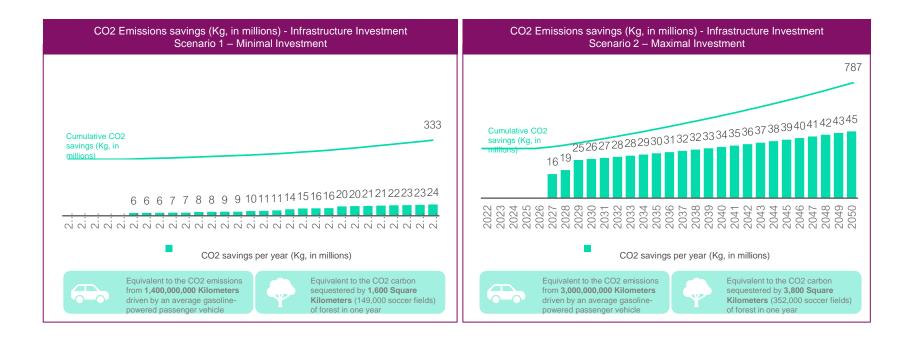


Market & Financial Perspective

Induced traffic and possibly selling electricity will help airports to recover investments



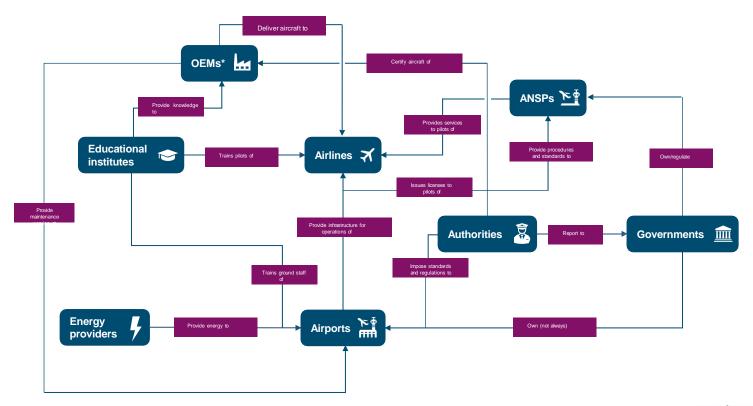
Market & Financial Perspective Being a net zero technology, reduction in emissions is immediate



Will E-flight take off in LAC? Implementation Perspective

Implementation Perspective

lintroducing a new technology in aviation requires involvement of many stakeholders



Implementation Perspective And working together will accelarate the introduction of e-flight



A joint vision...

Events & exchange

Actions	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	20
Inform aviation stakeholders on electrification developments															
Stimulate fast certification and standardisation															
Certification process adaptation for electric aircraft and airport infrastructure															
Inform on electric aircraft capabilities, requirements and cost															
Prepare transition plan to increase sustainable power capabilities															
Work on range and capacity increase of electric aircraft															
Facilitate development of sustainable power generation															
Prepare business case for green energy as resource for electric aircraft															
Support standardisation of charging stations and power plugs															
Define universal standards for charging stations and procedures															
Define guidelines for fire department at the airport															
Share aircraft specifics and requirements with other stakeholders															
Work with the government on strategy plan for renewable energy sources															
Investigate replacement potential of eletric aircraft within company															
Set up pliot training															
Set up research programs															
Upscale energy requirements to allow for higher demand															
Investigate revenue potential of electric flying															
Train pilots, ground staff and handlers				_	_	-									
MRO adaptation for electric aircraft and training of staff					_	-									
Design ATM procedures and routing for electric aircraft															
Start transition to 100% green power sources															
Introduce electric motors in propulsion curriculums															
Purchase infrastructure (charging stations, energy storage etc.)															
Update/optimise flight schedule and network for eletric flights															
Integrate electric aircraft into fleet and operations															
Install infrastructure															

Aligning activities

Will E-flight take off in LAC? Concluding Remarks

information Classification: General

Concluding remarks: will e-flight take off in LAC?

- E-flight flight offers a new aircraft technology that can be interesting for airlines that look to service short, underserved routes
- Consisting of large countries with remote areas, and island regions, e-flight could be very applicable to the LAC region
- Route economics of e-aircraft will only be superior compared to existing aircraft in longer term, unless regulators and governements decide to incentivize
- To make e-flight happen, aviation sector stakeholders must come together and collaborate, and investments in infrastructure must be made