NACO
a company of Royal HaskoningDHV

Will e-flight take off in LAC?

CAPA Airline Leader Summit Latin America & Caribbean Summit

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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

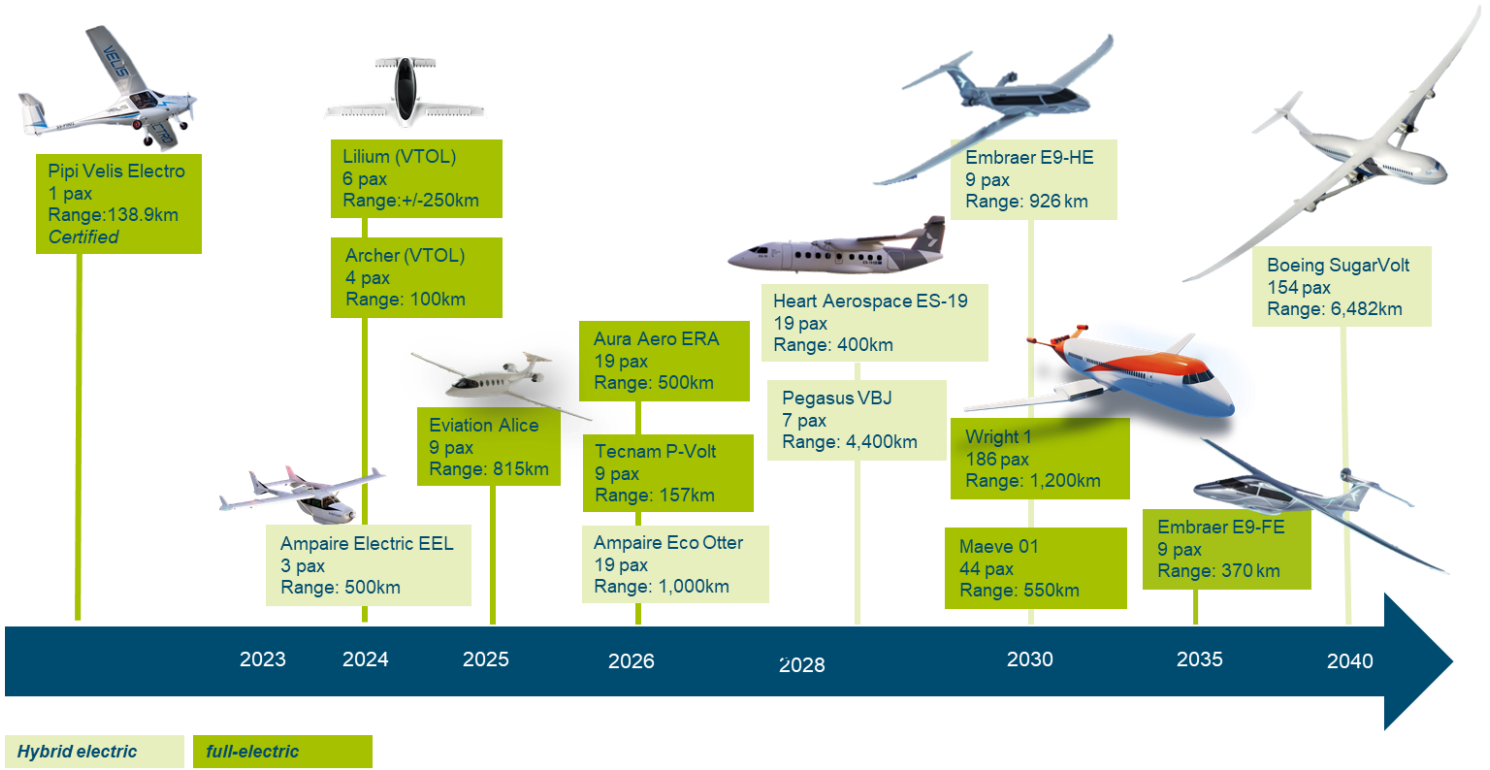
E-flight: one of the sustainable technologies the sector is betting on

Sustainable Aircraft Fuels

(Hybrid) Electric Aircraft

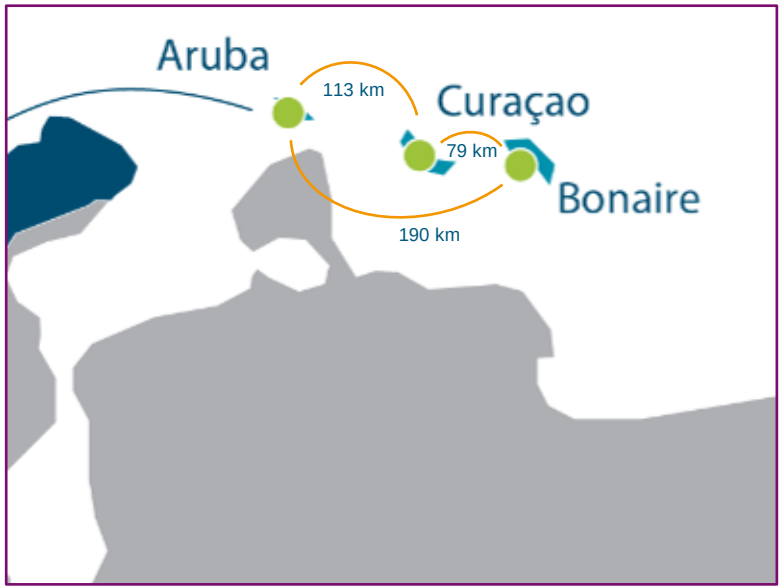
Hydrogen Powered Aircraft

The development of E-aircraft: a dynamic landscape



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

Connecting remote regions in Columbia



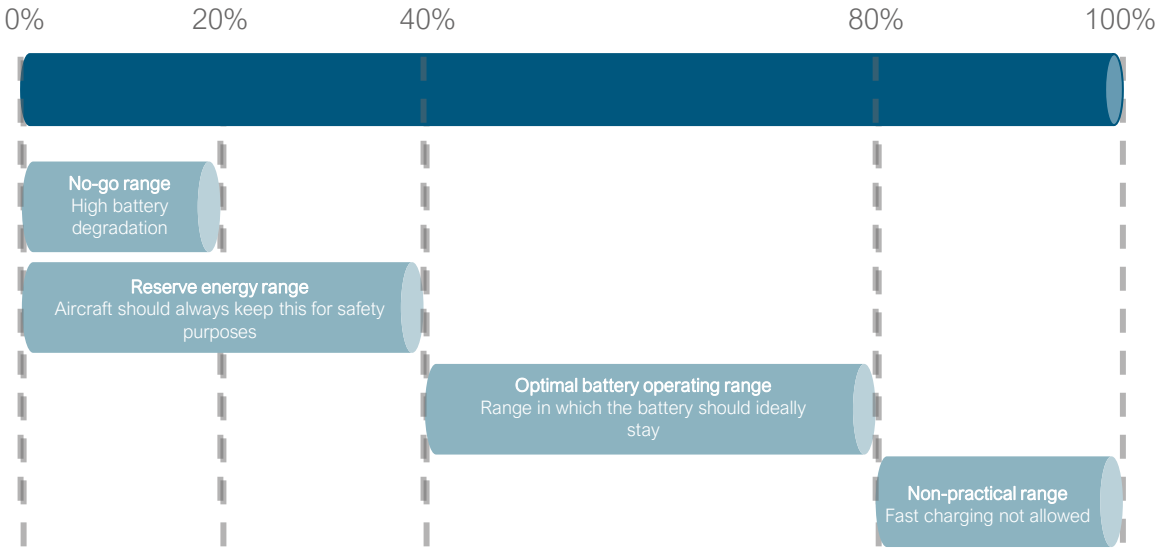
Connecting Dutch carribean ‘ABC’ islands

Will E-flight take off in LAC?

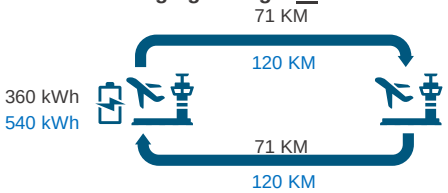
Technical & Operational Perspective

Technical & Operational Perspective

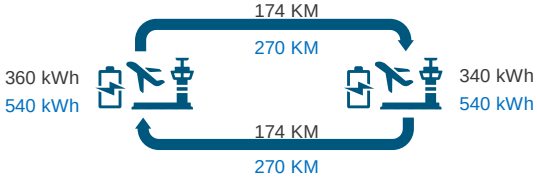
Battery capacity limits the range of e-aircraft in more than one way...



Charging at origin or destination

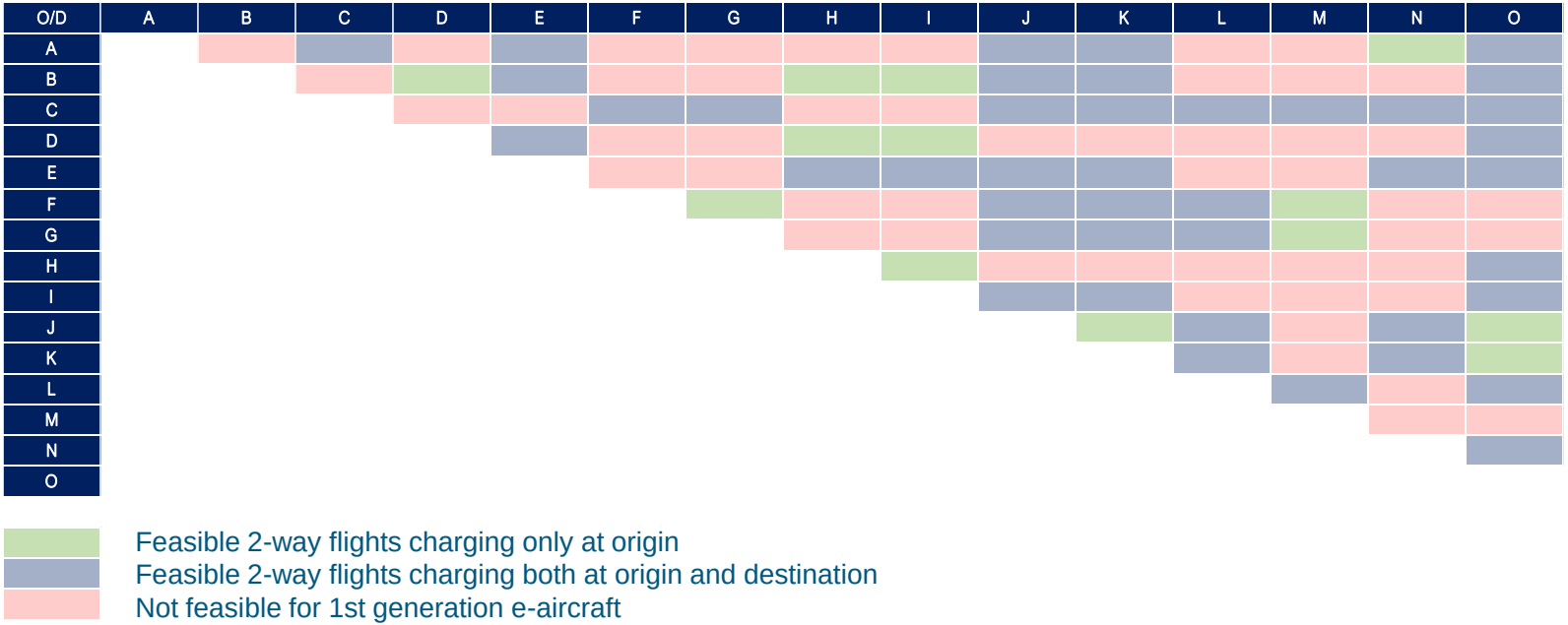


Charging at origin and destination



... 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



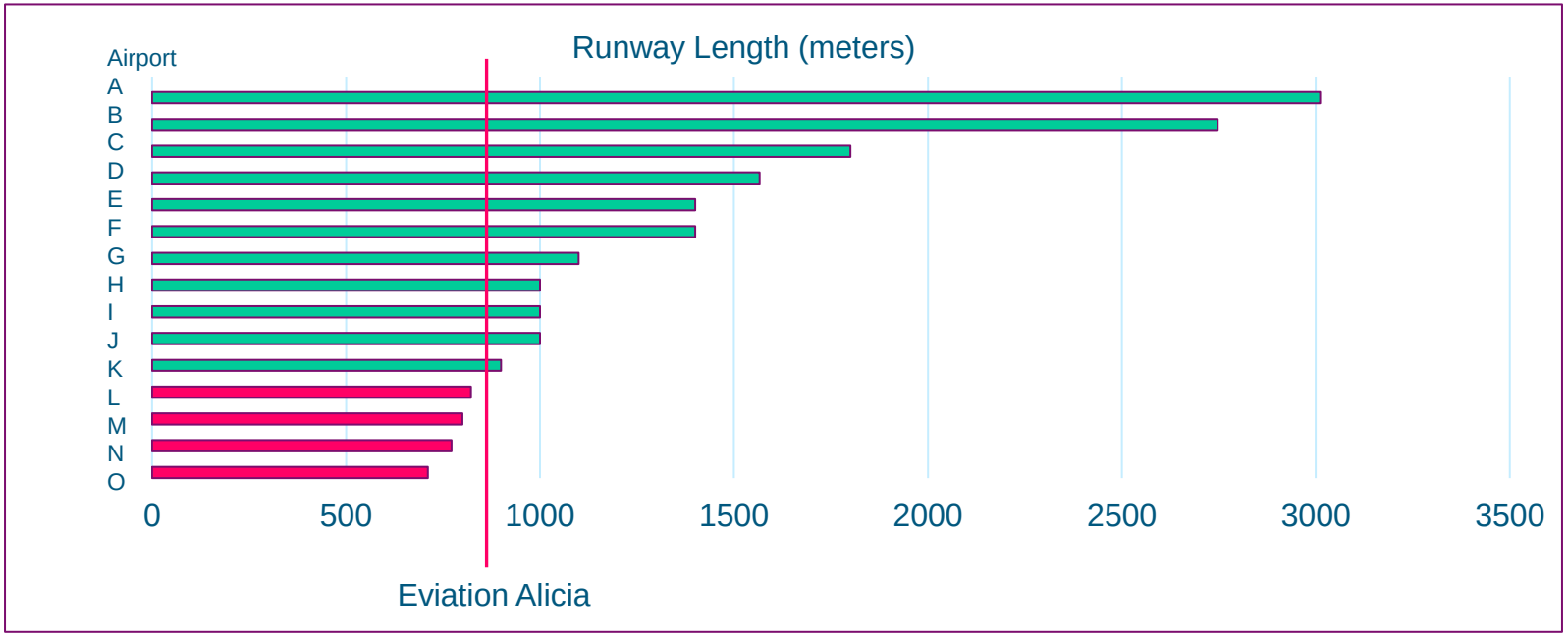
Batteries make E-aircraft heavier, hence have longer landing and takeoff distances...

Cessna 208 Gran Caravan
- 10-12 pax
- MTOW 4 tons
- Take-off Distance: 560 m
- Landing Distance: 658 m

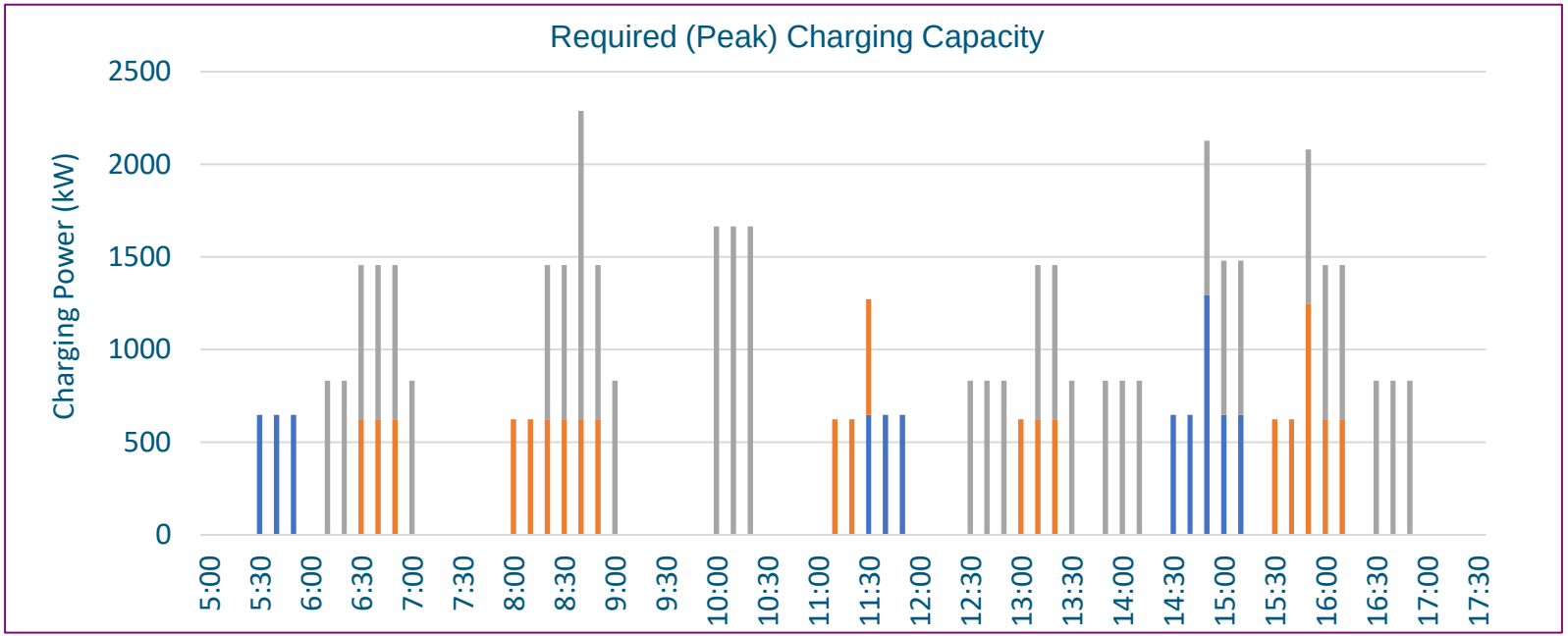
Full electric: Eviation Alice
- 9 pax
- MTOW 8 tons
- Take-off Distance: 840 m
- Landing Distance: 625 m

Technical & Operational Perspective

...which translates into runway length requirements

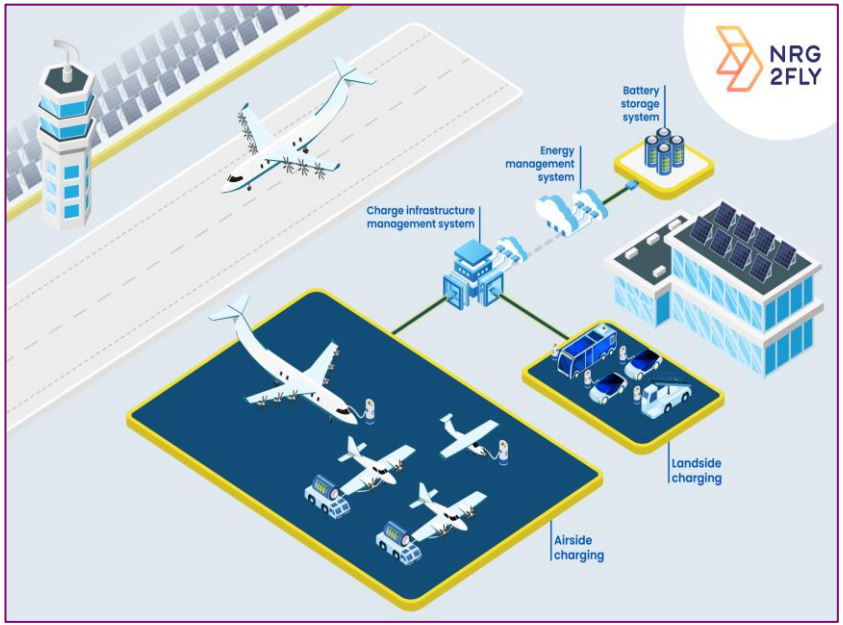


Third, e-craft need fast charging, taking into account peak hour activity...

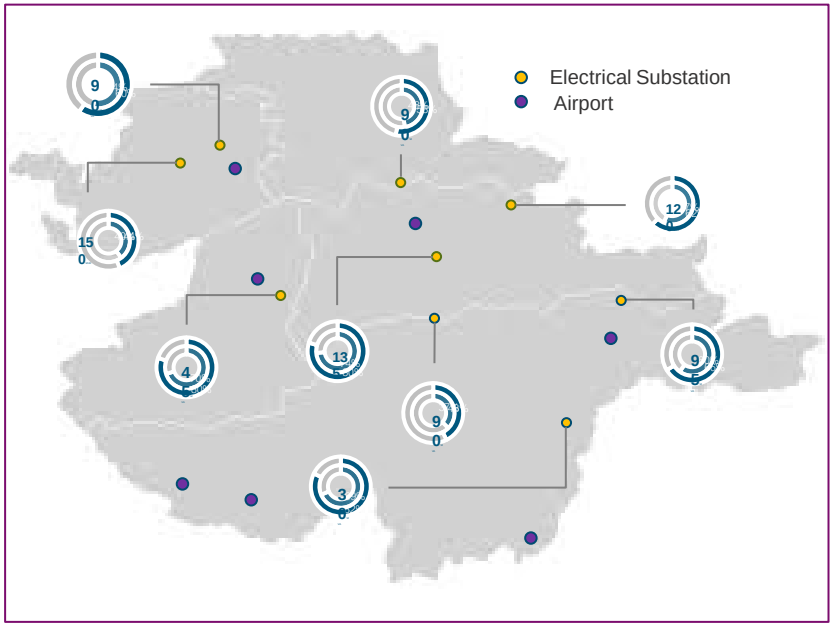


Technical & Operational Perspective

... which requires an assessment how to provide the required peak loads

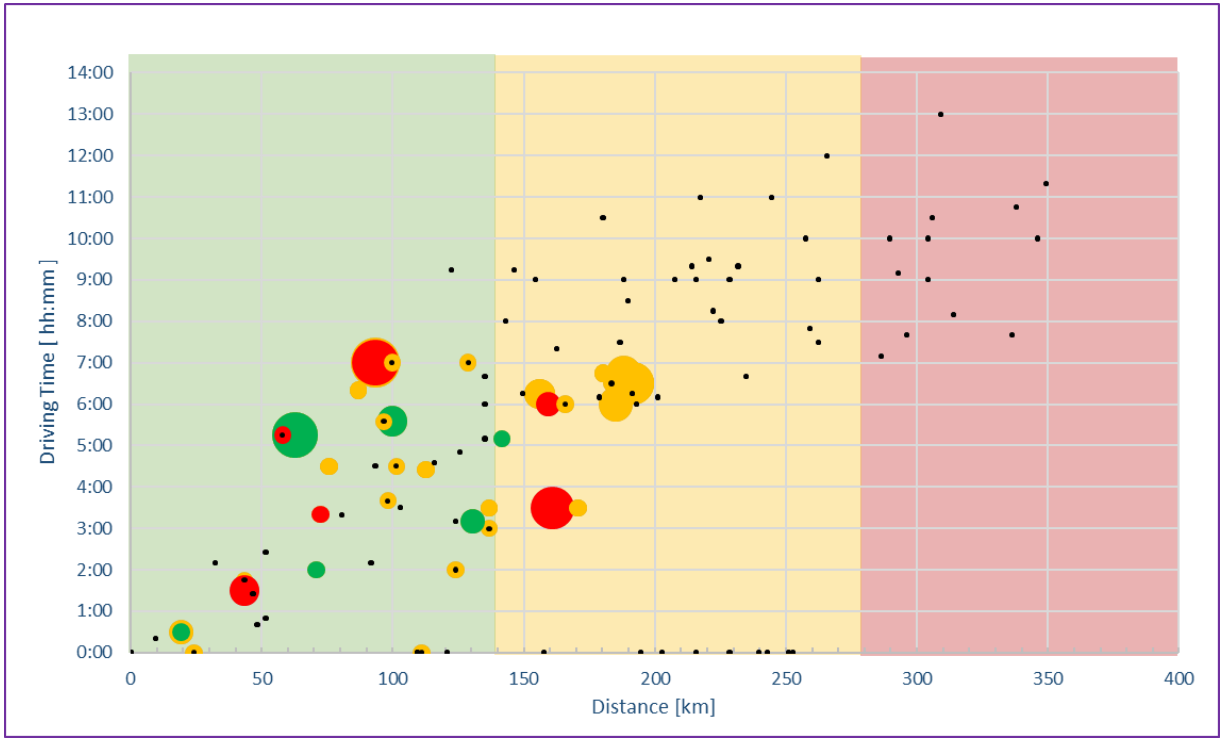


Airport electric infrastructure *(source: NRG2FLY)*



Electricity productivity map

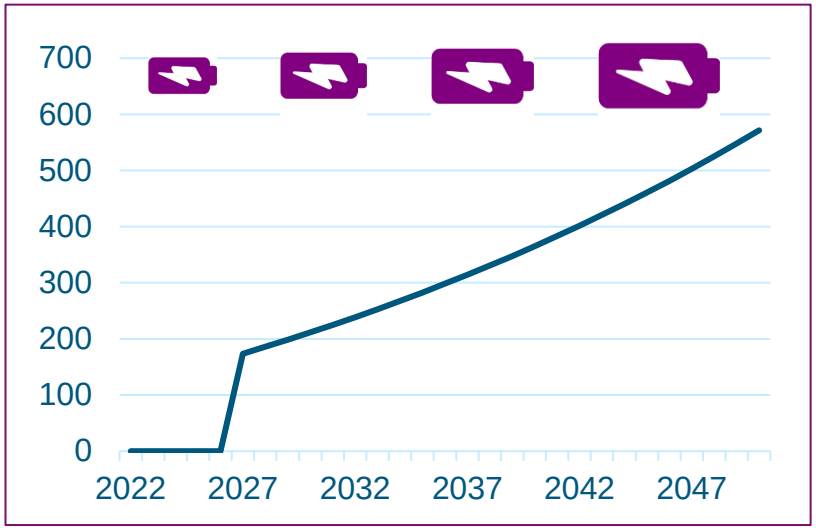
Considering all requirements, a feasibility map can be constructed to set priorities



Will E-flight take off in LAC?

Market & Financial Perspective

Battery technology development and investments will grow the e-flight potential...

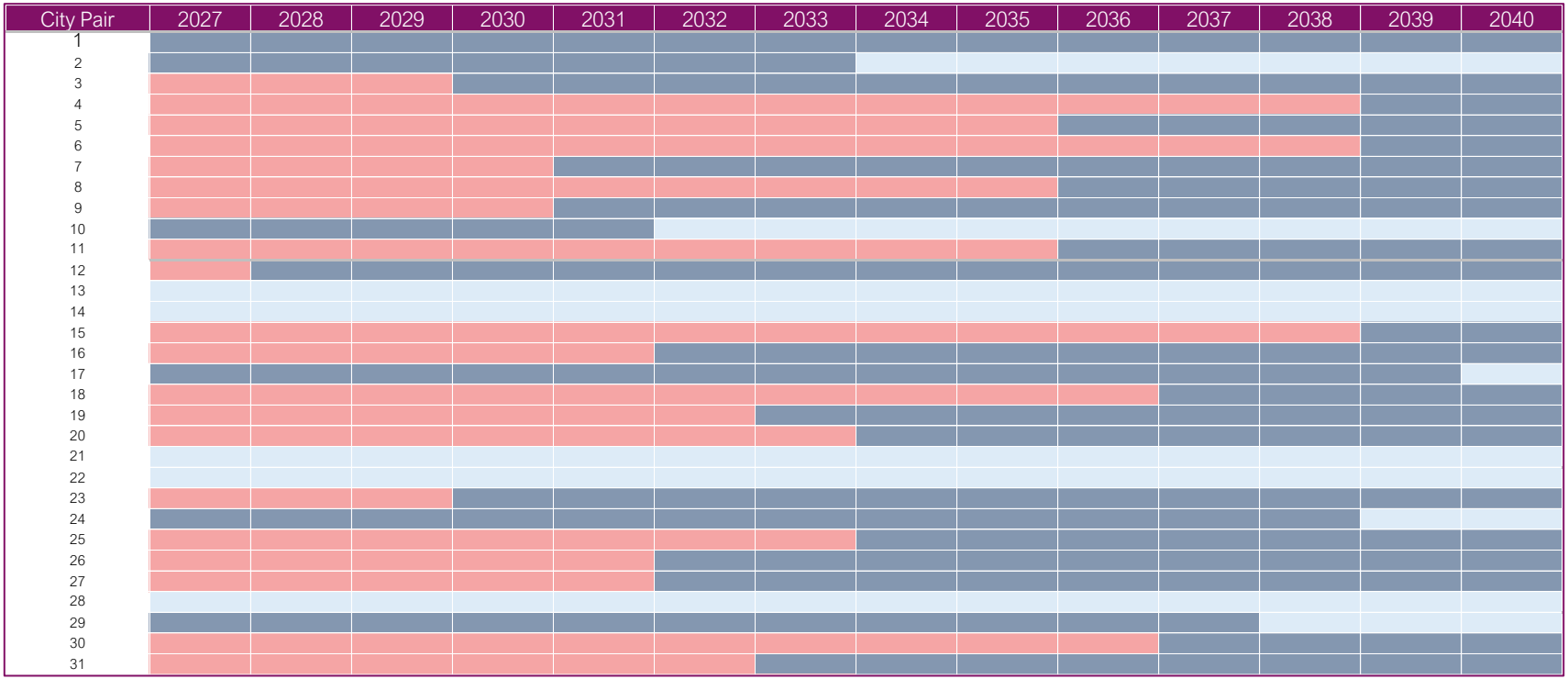


Development maximum range Aviation Alice (km)

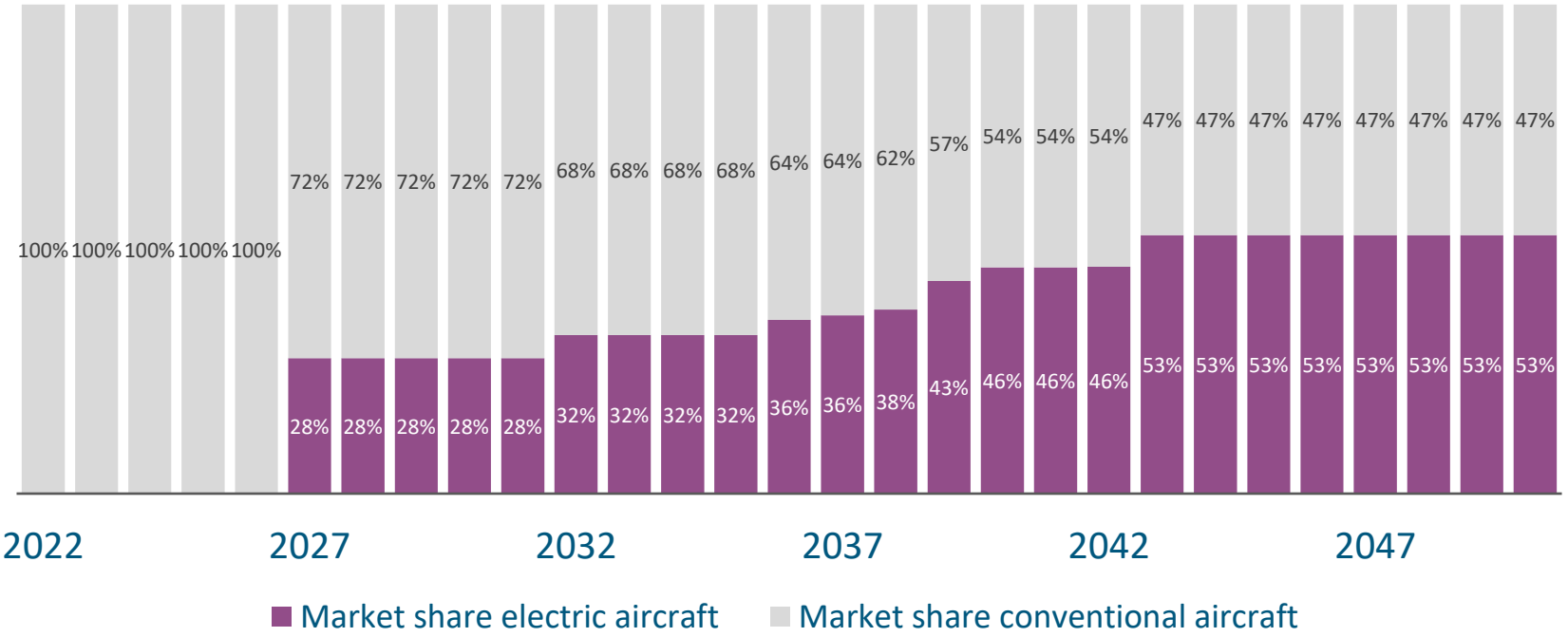
	Phase 1: 2026	Phase 2: 2030	Phase 3: 2035
Solar (m2)	3000	9000	18000
Chargers (#)	2	3	5
Electric infra (k€)	650	900	1300
Storage (k€)	50	150	200
Stands (k€)	100	100	200
Contigency (k€)	200	350	500
Total cost (k€)	**1000**	**1500**	**2200**

Investment plan in charging equipment

... bringing more and more feasible city-pairs into play over time

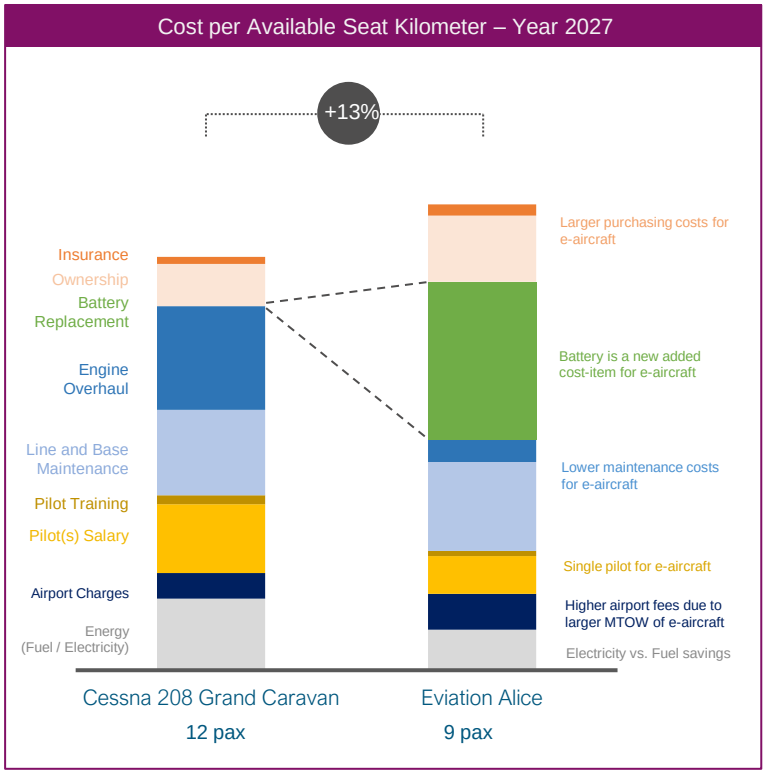


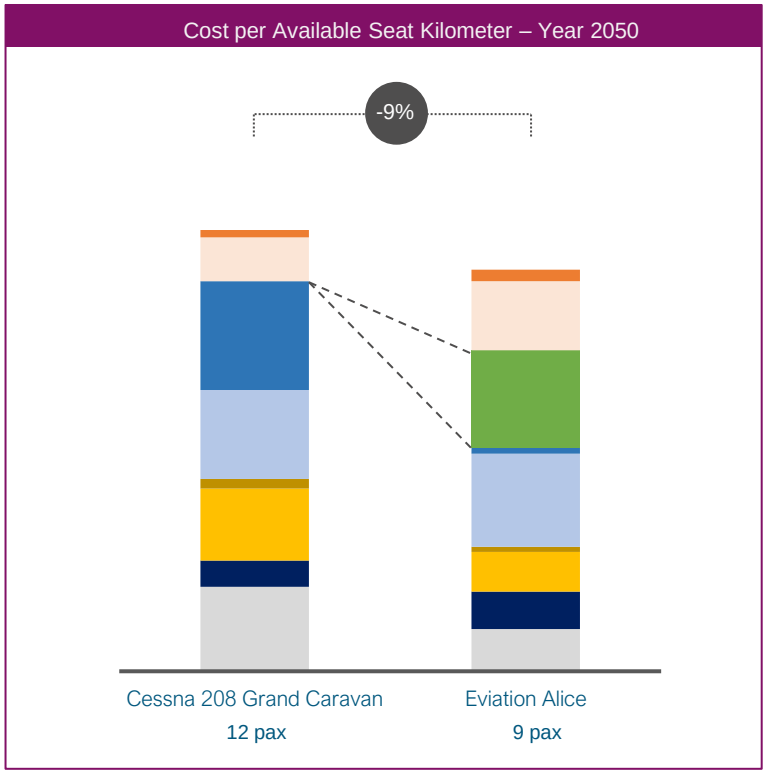
Weaving this in with a traffic forecast will give insight in the growth of e-flights



Market & Financial Perspective

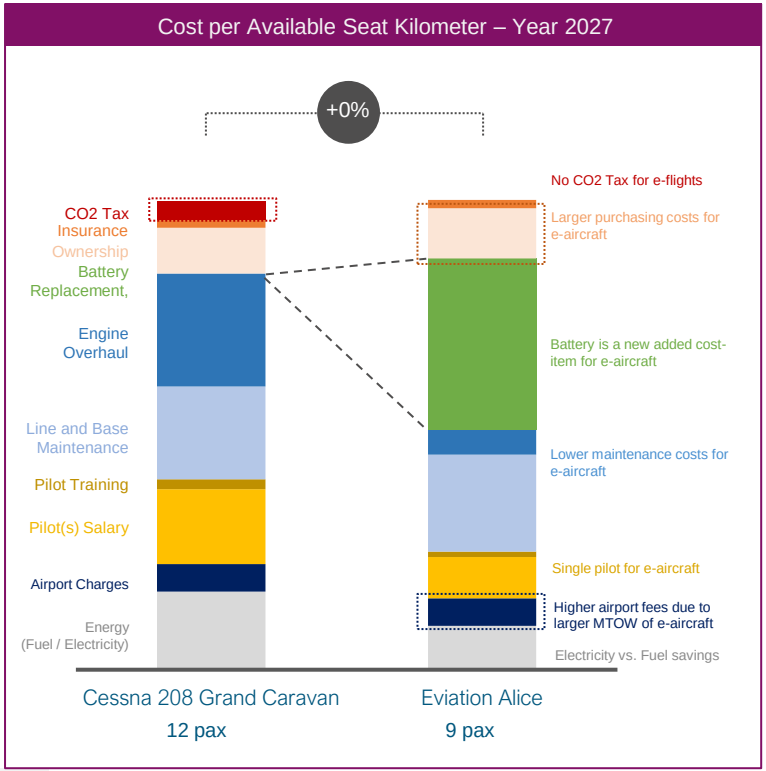
E-flight will not bring airlines better route economics in the near future...

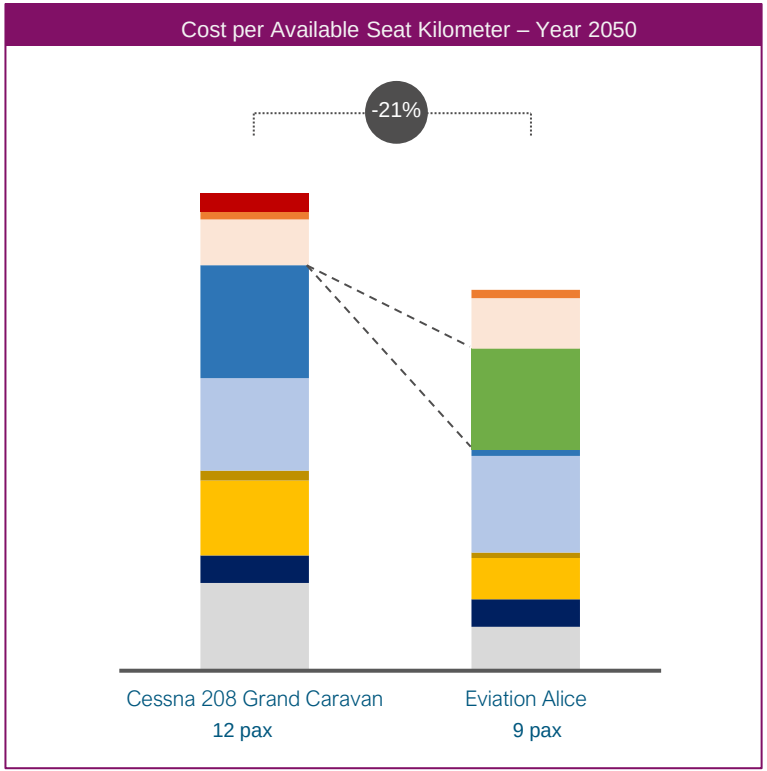




Market & Financial Perspective

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

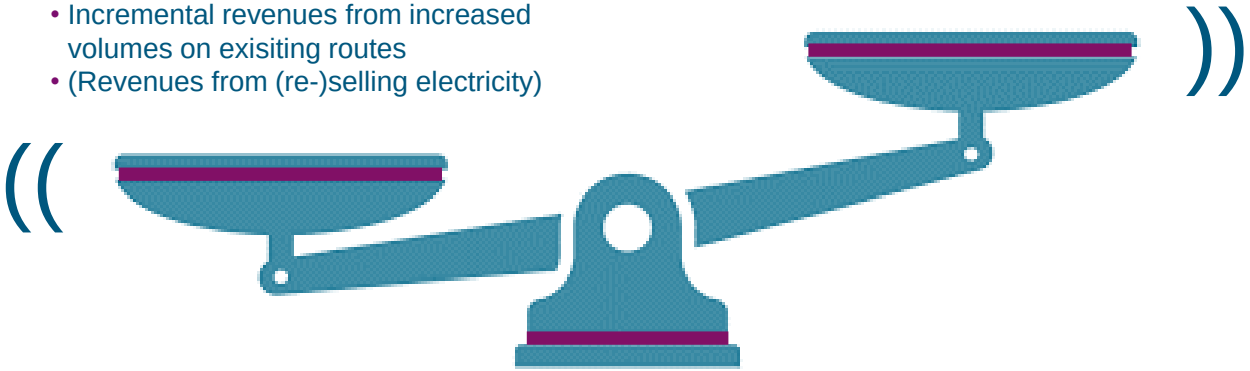




Induced traffic and possibly selling electricity will help airports to recover investments

- Capital expenses of electrical infra
- Maintenance expenses of electric infra
- (Capital expenses in solar farm)
- (Operating expenses of recharging service)

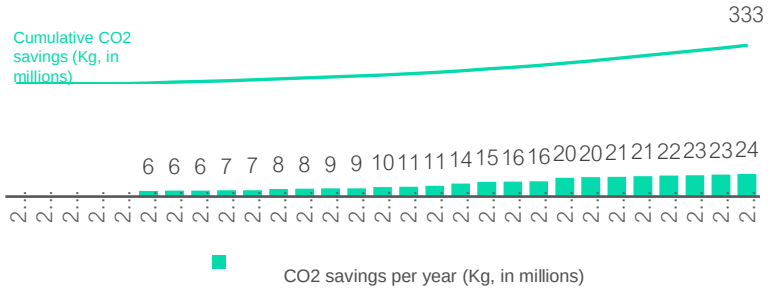
- Incremental revenues from new routes
- Incremental revenues from increased volumes on exisiting routes
- (Revenues from (re-)selling electricity)



Market & Financial Perspective

Being a net zero technology, reduction in emissions is immediate

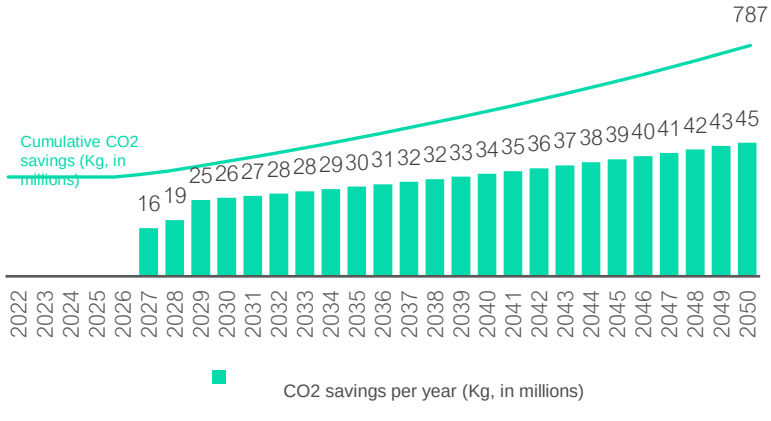
CO2 Emissions savings (Kg, in millions) - Infrastructure Investment Scenario 1 – Minimal Investment



Equivalent to the CO2 emissions from **1,400,000,000 Kilometers** driven by an average gasoline-powered passenger vehicle

Equivalent to the CO2 carbon sequestered by **1,600 Square Kilometers** (149,000 soccer fields) of forest in one year

CO2 Emissions savings (Kg, in millions) - Infrastructure Investment Scenario 2 – Maximal Investment



Equivalent to the CO2 emissions from **3,000,000,000 Kilometers** driven by an average gasoline-powered passenger vehicle

Equivalent to the CO2 carbon sequestered by **3,800 Square Kilometers** (352,000 soccer fields) of forest in one year

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Implementation Perspective

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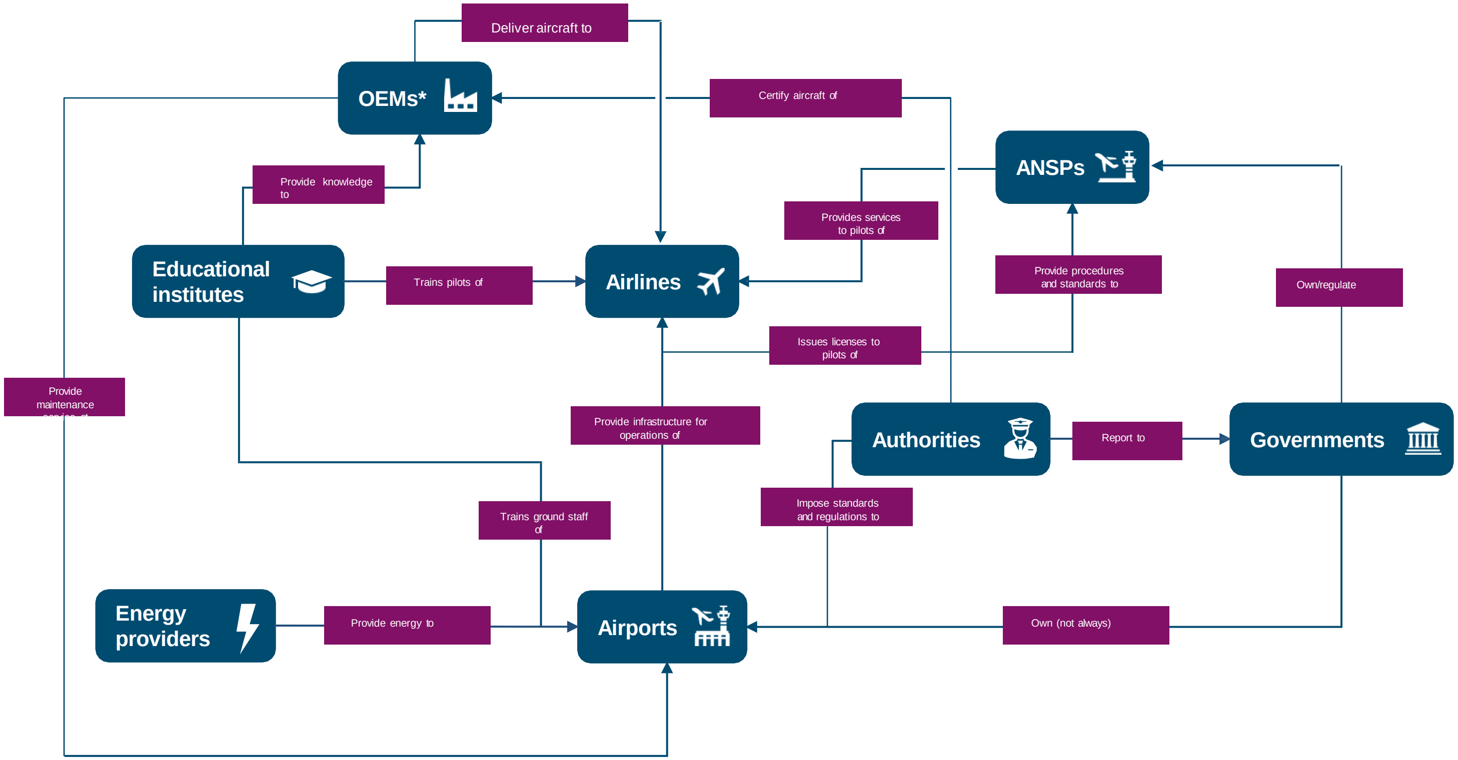
Iintroducing a new technology in aviation requires involvement of many stakeholders

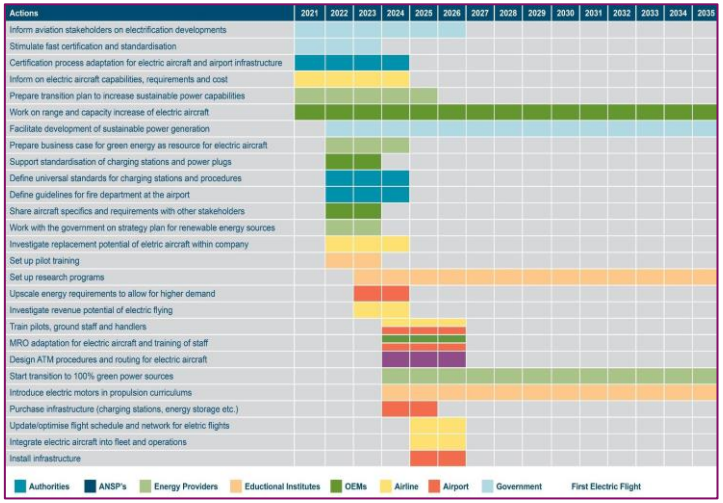


Implementation Perspective

And working together will accelarate the introduction of e-flight

A joint vision...

Events & exchange



Aligning activities

Will E-flight take off in LAC?

Concluding Remarks

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