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Dedicated to innovation in aerospace



DESTINATION
2050

VILNIUS

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KEY TAKEAWAYS

- Improvements in ATM and airline operations can yield a 6% reduction of CO₂ emissions in 2050. Many of these improvements can be delivered in short & medium term.
- Interdependencies and different stakeholder priorities are a key challenge in delivering ATM and operational improvements.
- KPIs and incentives for different stakeholders should be targeted at achieving a social optimum.
- An economic social cost-benefit analysis provides a comprehensive assessment of costs and benefits across different stakeholder groups.
- Decision-making in ATM should be based on maximising social benefits.

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INTRODUCTION

About SEO

- Independent research consultancy practice affiliated to the University of Amsterdam
- ~45 highly educated staff (PhD/ MSc. in econometrics/economics)

SEO's aviation practice

- Applied economic research in the field of aviation (e.g. economic impact, Social Cost-Benefit Analysis, connectivity analysis)
- Destination 2050
- 'Economic impacts of airspace modernisation'
- 'Environmental impacts of airspace disruptions'

About Royal NLR

- Unaffiliated research centre in aviation and aerospace
- Bridges the gap between fundamental research and practical applications
- Founded in Amsterdam (the Netherlands) > 100 years ago
- Heavily involved in SESAR, Clean Sky (2) / Clean Aviation and other EU programmes
- Departments focused on aviation sustainability, as well as ATM / airports
- Project lead for Destination 2050

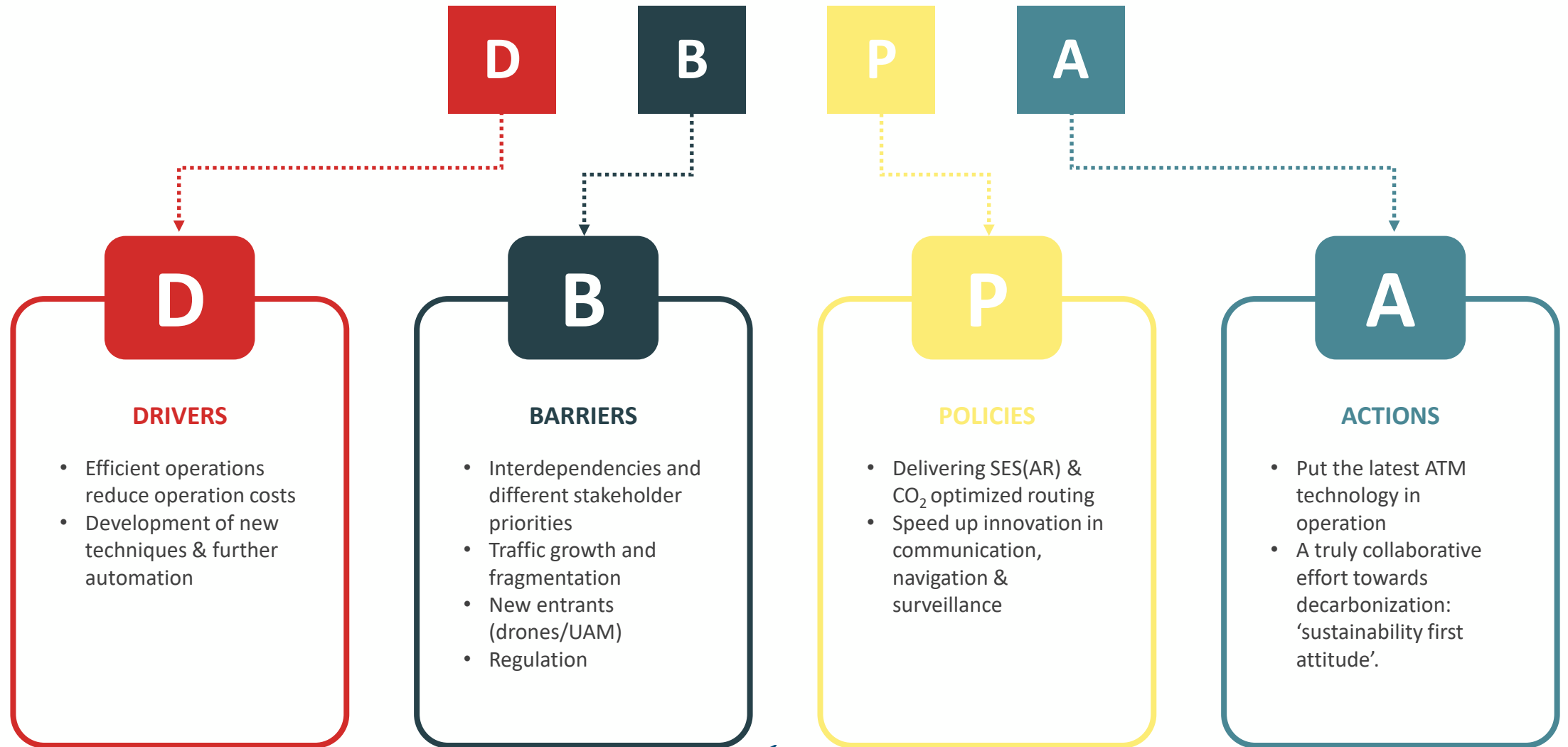
DESTINATION 2050

Improvements in ATM and airline operations can lead to a 6% reduction in CO₂ emissions in 2050; most improvements can be delivered in short or mid-term

- Under ATM and operations D2050 considers:
 - Airline operations
 - Airspace and air traffic management
 - Ground operations at airports (excluding ground handling equipment, terminal buildings, etc.)

- Considering ATM:
 - Largest benefits foreseen in SES/SESAR (7.1% reduction intra-EU, including for CO₂-optimised routing)
 - Beyond SESAR:
 - Non-EU ATM efficiency improvements
 - Improved North-Atlantic efficiency
 - Wake Energy Retrieval

D2050: DRIVERS, BARRIERS, POLICIES & ACTIONS



INTERDEPENDENCIES

Interdependencies and different stakeholder priorities are a key challenge in delivering ATM improvements

- Tradeoffs – CO₂/ fuel burn versus:
 - Costs (e.g. fuel costs vs. ANS charges)
 - Noise (e.g. detour to reduce densely populated areas)
 - Other emissions (e.g. NO_x, impacts on local air quality, etc.)

TOWARDS A TRULY COLLABORATIVE APPROACH

KPIs and incentives for different stakeholders should be targeted at achieving a social optimum

- Setting the right incentives & prevent that KPIs hinder CO₂ reduction
- Examples of potential conflicting KPIs
 - Airlines: minimising cost (function of fuel burn, ATM cost, etc.)
 - Airports: minimising departure delay
 - ANSPs: shortest route length / horizontal efficiency
- Overall: using shortest (horizontal) path as proxy for most fuel-efficient / CO₂-optimal flight

SOCIAL COST-BENEFIT ANALYSIS

An economic social cost-benefit analysis provides a comprehensive assessment of costs and benefits across different stakeholder groups

- EC (2014). Guide to Cost-Benefit Analysis of Investment Projects
- FAA (2020). Airport Benefit-Cost Analysis Guidance
- SEO (2021). Guidelines for SCBA in Aviation
- EUROCONTROL: Standard Inputs for Economic Analyses

- Relatively limited socio-economic impact studies in ATM:
 - SESAR JU (2011). Assessing the macroeconomic impact of SESAR.
 - SEO (2016). Economic benefits of European airspace modernization.

SOCIAL COST-BENEFIT ANALYSIS

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Actor	Impacts	Impact in €
<i>ANSPs</i>	<ul style="list-style-type: none"> • Charges revenues • Shift of revenues between ANSPs • Investment costs • ... 	+/- € ...
<i>Airspace users</i>	<ul style="list-style-type: none"> • Fuel costs • ANS costs • CO₂ compliance costs • Other operational costs (e.g. crew, delays, maintenance, etc.) • Investment costs • ... 	+/- € ...
<i>Passengers / cargo shippers</i>	<ul style="list-style-type: none"> • Air fares • Travel times • ... 	+/- € ...
<i>External impacts</i>	<ul style="list-style-type: none"> • CO₂ emissions & climate change impacts • Local pollution • Noise • Safety • ... 	+/- € ...
Total	Sum of all impacts	+/- € ...

CONCLUSIONS

- Improvements in ATM and airline operations can yield a 6% reduction of CO₂ emissions in 2050. Many of these improvements can be delivered in short & medium term.
- Interdependencies and different stakeholder priorities are a key challenge in delivering ATM and operational improvements.
- KPIs and incentives for different stakeholders should be targeted at achieving a social optimum.
- An economic social cost-benefit analysis provides a comprehensive assessment of costs and benefits across different stakeholder groups.
- Decision-making in ATM should be based on maximising social benefits.

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ABOUT SEO AMSTERDAM ECONOMICS

SEO Amsterdam Economics conducts applied economic research on behalf of both public and private sector clients. Our research is fully independent, thus helping our clients to take the right decisions. SEO is affiliated with the University of Amsterdam and has extensive expertise in many markets. Our strength is our analytical approach, using a mix of quantitative and qualitative research methods and techniques.

The aviation department specializes in airline and airport connectivity analysis, traffic forecasting, economic impact assessments, Social Cost-Benefit Analysis (SCBA), emissions modelling and benchmarking of airport charges and taxes. Its researchers regularly publish in scientific and professional journals, and provide lectures, educational programs, and trainings.

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