Supporting
European
Aviation

EUROCONTROL

EU4Climate Transport Adaptation Ukraine

Adapting Airports to a Changing Climate

Rachel Burbidge, EUROCONTROL

15th February 2020

FOUNDING MEMBER SESAR JOINT UNDERTAKING

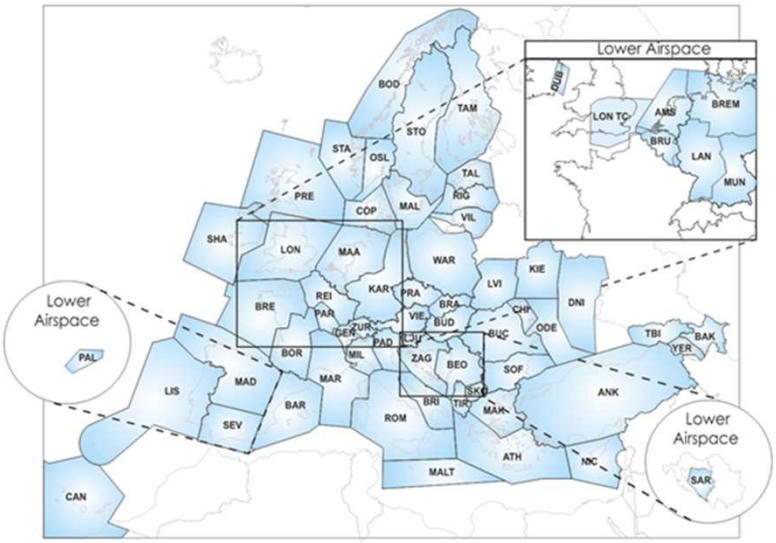
NETWORK MANAGER

Agenda

- Who are EUROCONTROL and what do we do on climate change adaptation?
- Main climate change risks for airports
- First thoughts on climate impacts for Ukraine's airports
- How to adapt and build resilience to climate change: Risk assessment
- How to adapt and build resilience to climate change: Adaptation planning and implementation
- Resources and Support

EUROCONTROL

ICAO: The contracting States recognise that every State has complete and exclusive sovereignty over the airspace above its territory.

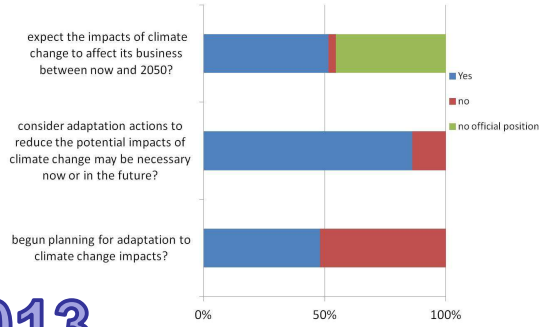


EUROCONTROL

- 41 Member States, typically each with its own ANSP
- Approximately 64 Area Control Centres (ACC)
- Over 700 sectors when at full capacity
- Approx. 17,000 Air Traffic Controllers
- 14.2 million flight hours controlled

EUROCONTROL’s work on climate adaptation

2008



2013

2014

2018

Potential climate impacts for airports

AIRPORT OPERATORS

Precipitation change

- Disruptions to operations (e.g. airfield flooding, ground subsidence)
- Reduction in airport throughput
- Inundation of transport access (passengers and staff)
- Loss of local utilities provision (e.g. power)
- Inadequate drainage system capacity
- Inundation of underground infrastructure (e.g. electrical)

Sea-level rise

- Loss of airport capacity
- Loss of airport infrastructure

Temperature change

- Changes in noise impact due to changes in aircraft performance
- Heat damage to airport surface (e.g. runway, taxiway)
- Increased heating and cooling requirements

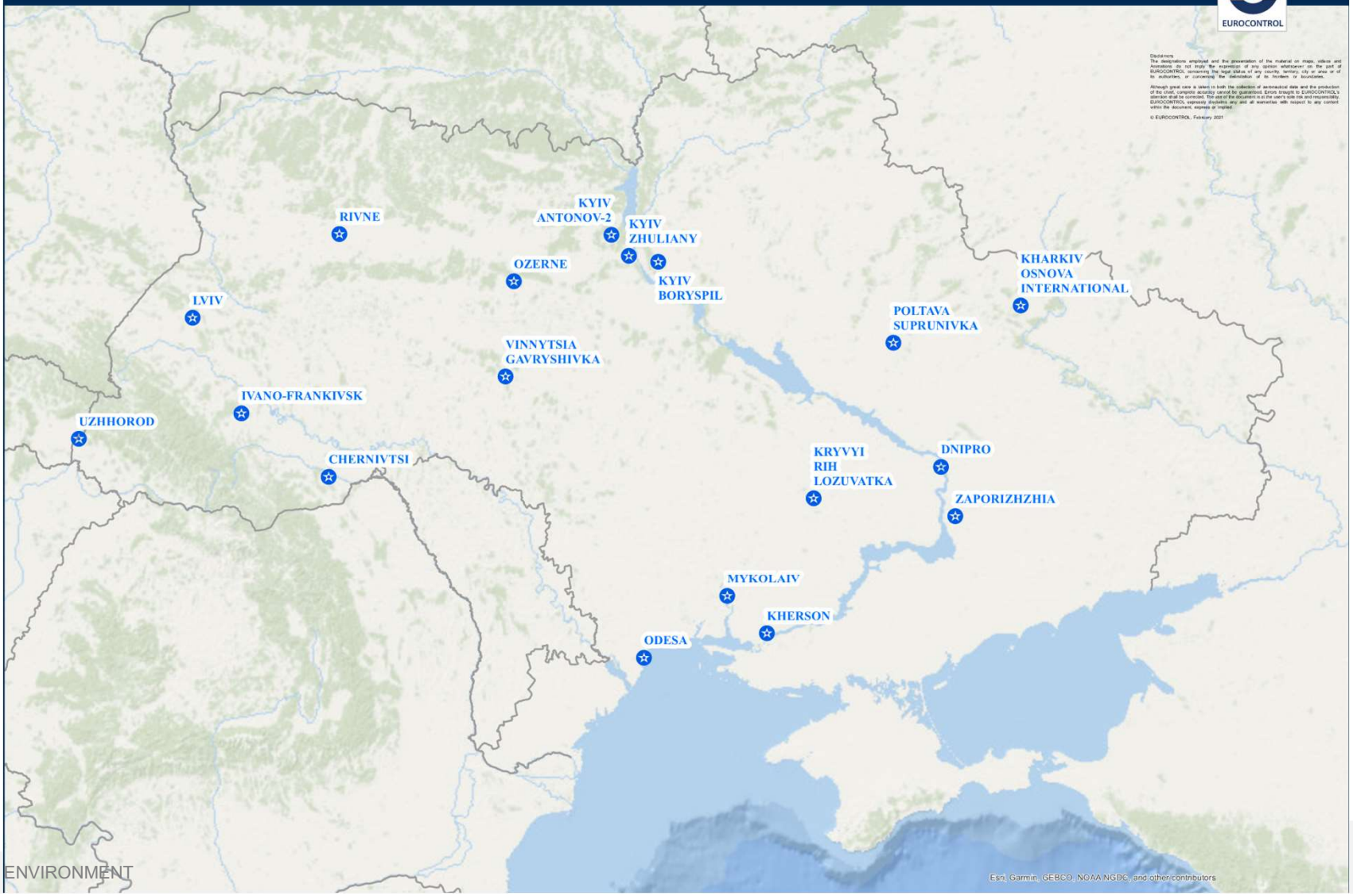
Wind changes

- Convective weather: disruption to operations
- Local wind patterns: potential disruption to operations and changes to distribution of noise impact
- Crosswinds: reduction in capacity

Extreme events

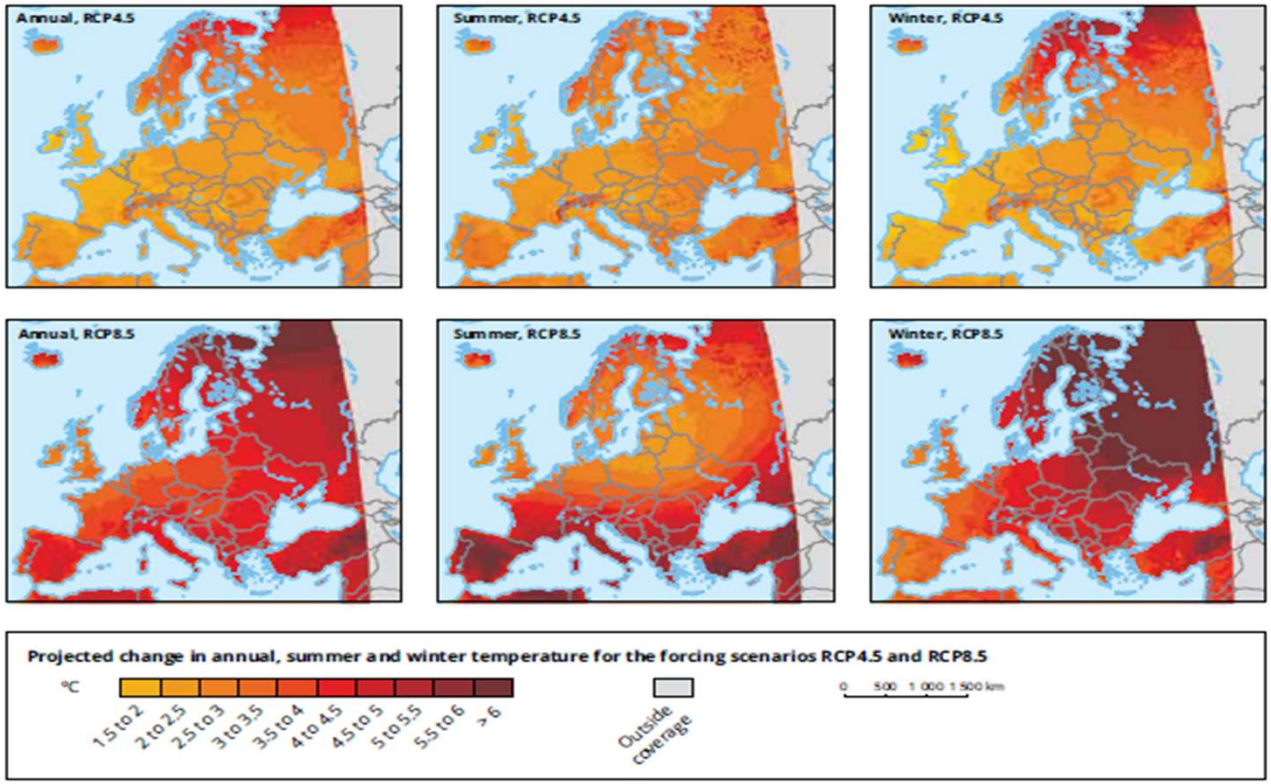
- Disruptions to operations
- Disruption to ground transport access
- Disruption to supply of utilities

International Airports in Ukraine



Temperature change

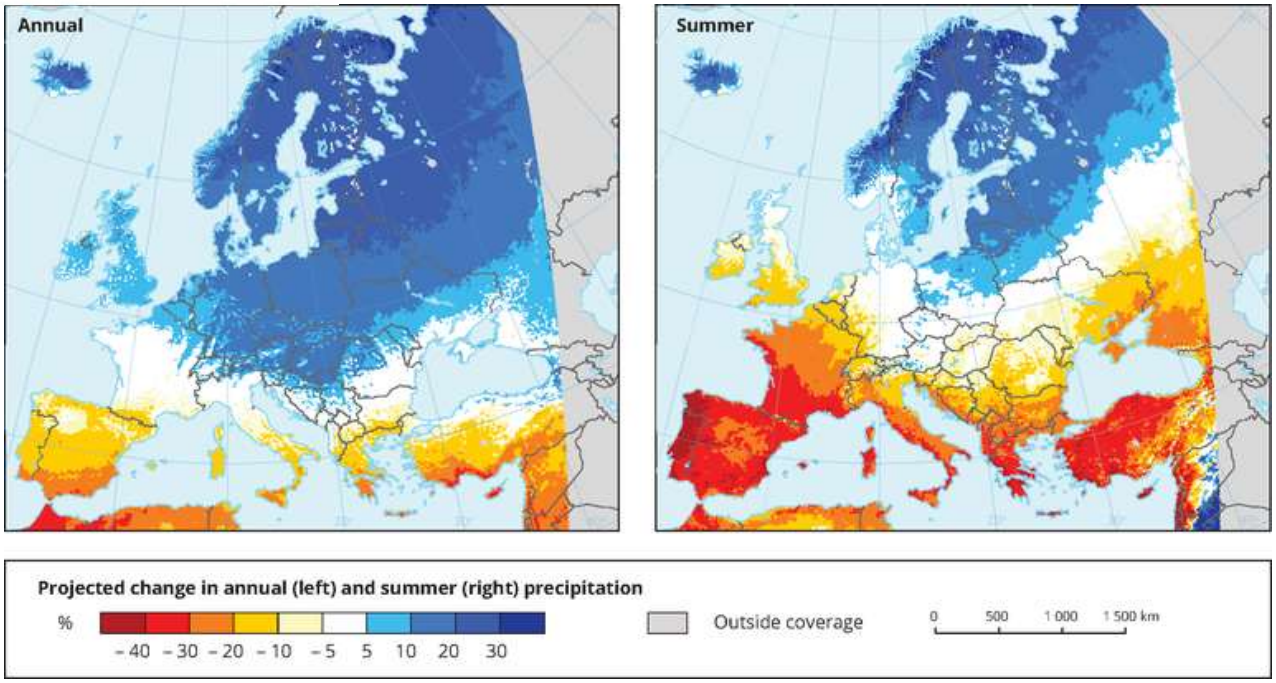
- Changes in noise impact due to changes in aircraft performance
- Heat damage to airport surface (e.g. runway, taxiway)
- Increased heating and cooling requirements



Projected changes in annual, summer and winter near-surface air temperature (°C) for 2071-2100 compared with a 1971-2000 baseline (source: EURO-CORDEX (Jacob et al, 2014) in EEA 2017)

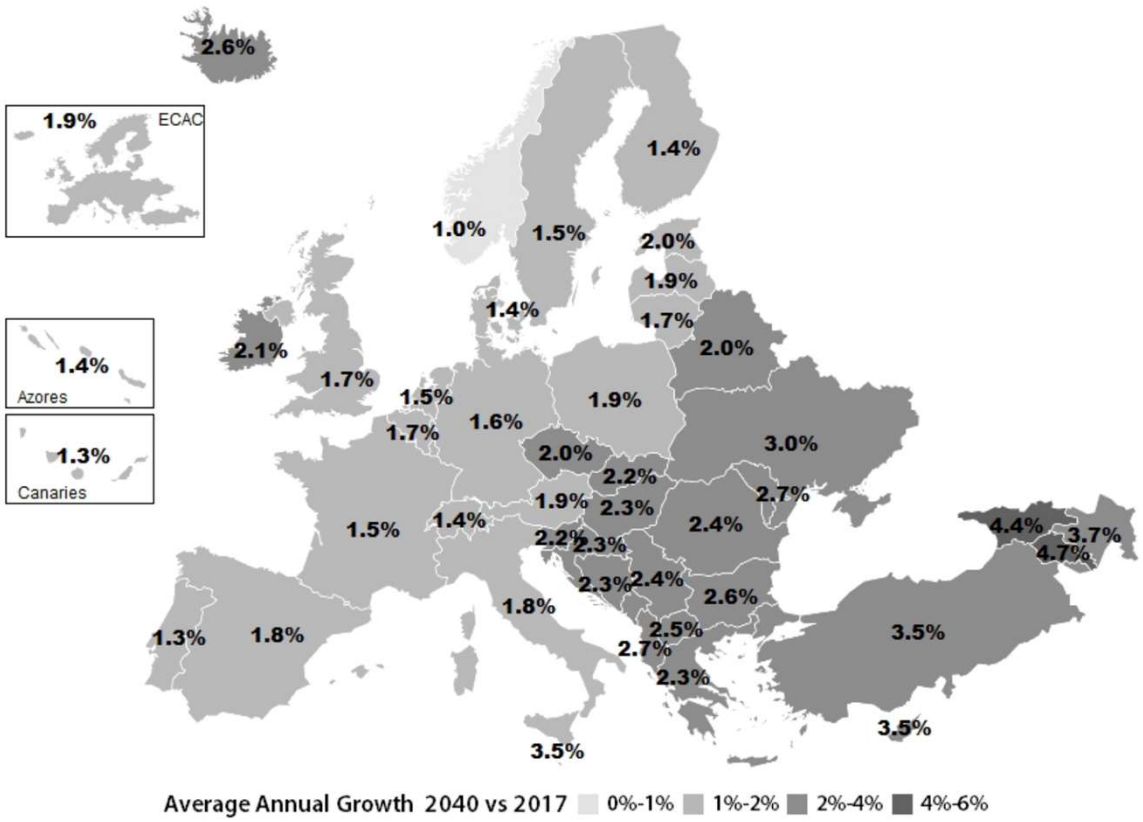
Precipitation change

- Disruptions to operations (e.g. airfield flooding, ground subsidence)
- Reduction in airport throughput
- Inundation of transport access (passengers and staff)
- Loss of local utilities provision (e.g. power)
- Inadequate drainage system capacity
- Inundation of underground infrastructure (e.g. electrical)



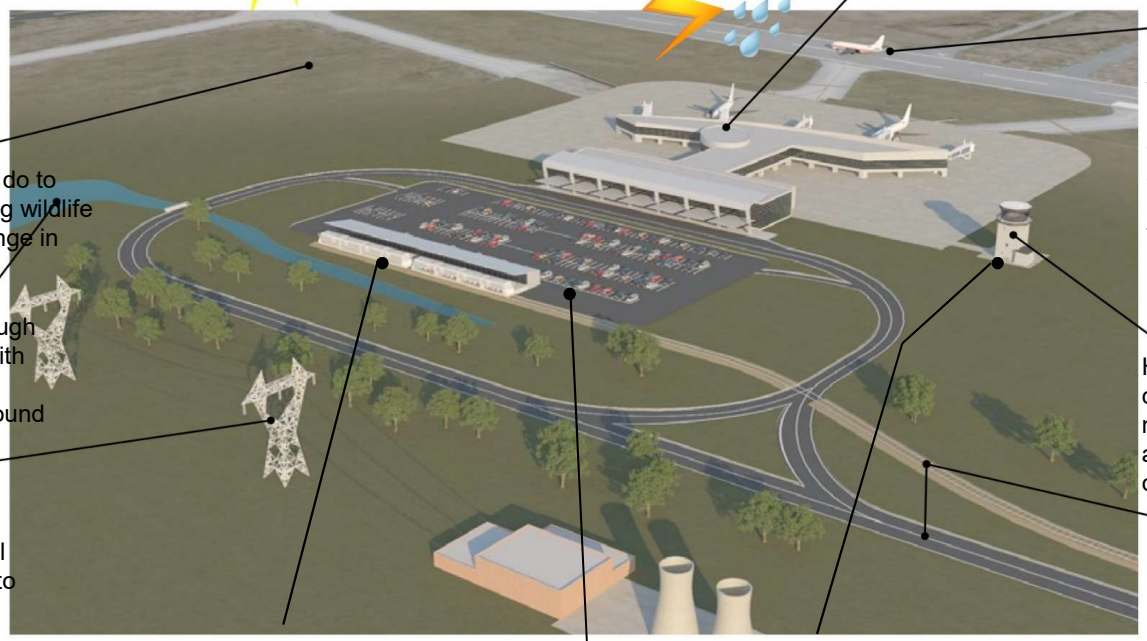
Projected changes in annual (left) and summer (right) precipitation (%) in the period 2071–2100 compared with a baseline period of 1971–2000 period for the IPCC scenario RCP8.5. (source: EURO-CORDEX (Jacob et al, 2014) in EEA 2017).

Climate change and traffic growth: a double challenge



Growth forecast to 2040 (IFR movements)

Risk assessment: where to start?



Do you know that there is increased fire risk due to increasing temperature?

Are you prepared for increasing number of use of your airport as shelter for weather related disasters?

Do you know how climate change will undermine the ground foundation of the terminal buildings?

Do you know that your runway may not be long enough for aircrafts to fly at higher temperature?

How will temperature change impact navigational signal and satellite coverage?

Can ground access be maintained with more extreme disruptive weather?

Will local climatic changes increase or decrease tourism demand in your region?

Can your drainage system handle any projected increase in rainfall?

Can your cooling system handle any projected increase in temperature?

What would happen to your airport if electrical system fails due to heavy wind and storm?

Will there be enough water available with increasing desertification around your airport?

What should you do to prevent increasing wildlife strike due to change in ecosystem?

Risk assessment: building collaboration

ENV
MAN

- Understand how the local climate might change: work with local MET providers.

ENV Ops
SAF BIZ
MAN

- Build the team: who is responsible and who needs to be involved e.g. operations, safety, business managers, airlines.
  Get senior leadership commitment.

ENV Ops
SAF BIZ
MAN

- Identify a risk assessment methodology: airport's existing risk assessment methodology or an external climate risk assessment methodology? Define scope of the assessment.

LEG

- Is there any legislation that needs to be complied with?

Risk assessment: getting into detail

ENV OPs SAF BIZ MAN

- Apply risk assessment methodology to identify potential impacts and vulnerabilities, including critical safety and operational risks that may affect the operation of the airport

ENV OPs SAF BIZ MAN

- Develop a climate adaptation plan and set of actions: there might not be resources to do everything so prioritise critical elements.

ENV OPs SAF BIZ MAN

- Periodically review the plan: the extent and timing of impacts might change so keep some flexibility.

Risk = probability of occurrence * impact

1) What could happen?

2) How likely is it to happen?

3) What are the potential consequences if it does happen

Heathrow
Risks and Control Measures

R	Significant
A	Moderate
G	Low

Risk ID	Risk	Climate Variable	Threshold	Confidence (climate projections and or consequences)	Risk Grading (no adpatation)	
					Short Term (to 2020)	Medium / Long (2020 to 2050s)
					AIRSIDE	
1	**Flashpoint of aviation fuel exceeded on hot days** - potential fire hazard.	Temp	Av gas flash point is 38°C. Temperatures during the summer of 2003 peaked at 37.5C	H	A	R
2	**Increased incidence of fuel venting** from aircraft in warm weather.	Temp	Av gas flash point is 38°C.	H	A	A
3	**Increased fire risk** due to hotter temperatures combined with increased lightning and drought potential.	Temp	Uncertain	M	G	A
4	**Change in distribution of pests and wildlife species**. Potential changes to bird migration patterns and bird strike risk.	Temp	Uncertain	L	G	G
5	**Reduced lift** for departing aircraft due to 'thin air' and reduced engine efficiency in very hot weather.	Temp	Aircrfat operate in multiple temp zones, unlikely to be breached	H	G	G
6	**Torrential rain creates hazardous conditions for vehicles and planes** i.e. airside and landside road vehicles, and taxiing and landing aircraft.	Precip.	See Strategic Flood Risk Assesment	H	G	A
7	**Seasonal changes to fog related disruption** (increase in winter months, decrease for remainder of year).	Fog	Low Visiblity Procedures when the Runway Visual Range (RVR) is < 600m and/or cloud ceiling is < 200 ft. Projections do not suggest any critical thresholds would be crossed	L	G	G
8	**Increased risk of schedule interruption** from stormy conditions.	Storms	High wind procedures and cross wind procedures enacted at defined criteria (dependent on aircraft type).	L	G	A
9	**Increased longevity of wing tip vortex effect** due to general becalming of surface wind speeds.	Wind	Wing tip vortex is particularly problematic for small planes taking off in quick succession after large aircraft.	L	G	G
10	**Change to prevailing wind direction affects runway utilisation** and schedules.	Wind speed/ direction	All commercial aircraft are tested to a"demonstrated" maximum crosswind as part of their certification. Large aircraft are better able to handle cross winds than light aircraft	L		
11	**Disruption to airfield operations from lightning** i.e. refuelling suspension, changes to flight routing.	Lighting	All commercial aircraft are tested for resilience to lightning strike as part of their certification. Planes can withstand lightning strike in the air but during take off and landing instrument loss would be critical hence the diversion of routes and stacks.	L	G	A

Adaptation Planning and Implementation

ENV OPs SAF BIZ MAN

- Apply risk assessment methodology to identify potential impacts and vulnerabilities, including critical safety and operational risks that may affect the operation of the airport

ENV OPs SAF BIZ MAN

- Develop a climate adaptation plan and set of actions: there might not be resources to do everything so prioritise critical elements.

ENV OPs SAF BIZ MAN

- Periodically review the plan: the extent and timing of impacts might change so keep some flexibility.

Adaptation Planning and Implementation

ENV OPs
SAF BIZ
MAN

- Apply risk assessment methodology to ide[illegible] mpacts and vulnerabilities, including critical safet[illegible] s that may affect the operation of the airport

ENV OPs
SAF BIZ
MAN

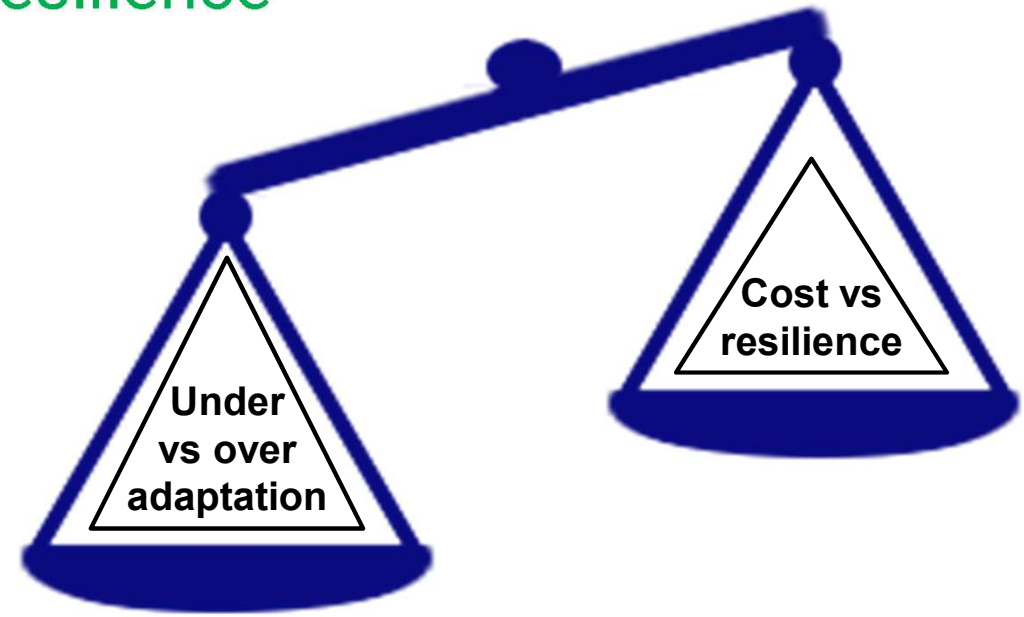
- Develop a[illegible] ns: there might not be reso[illegible] al elements.

ENV OPs
SAF BIZ
MAN

- Periodically review the plan: the extent and timing of impacts might change so keep some flexibility.

More than just an environmental concern:
Requires collaboration across the airport.

Building resilience



Don't confuse decisiveness with good decisions!

- How and when?
- Available resources?
- Collaboration and communication
- Local circumstances & biz models
- Cascading effects
- Criticality?

- Flexibility
- Low-regrets actions
- Pre-emptive action must be well-informed
- Review!

If you've seen one airport…

Q: Are you at risk from sea-level rise?
A: Can you allow some inundation? Can you build defences? Do you need to relocate?

Q: Are you expecting an increase in disruptive weather?
A: Do you have adequate MET forecasting capability? Proactively manage demand? Operational measures to increase flexibility? Information sharing systems?

Q: Are you expecting an increase in heavy precipitation?
A: Is your drainage capacity sufficient? Can you keep your ground transport links open?

Q: Are you expecting an increase in intensity and frequency of storms?
A: Is your contingency plan sufficient? Is your infrastructure reinforced?

Q: Are you expecting an increase in temperatures?
A: Are your surface materials adequate? Will demand change?

Different airports: different solutions…

If you've seen one airport…

Q: Are you at risk from sea-level rise?
A: Can you allow some inundation? Can you build defences? Do you need to relocate?

Q: Are you expecting an increase in disruptive weather?
A: Do you have adequate MET forecasting capability? P emand?
Operational measures to increase flexibility? Infor

Q: Are you expecting an increase in
A: Is your drainage capacity s nd transport links open?

Q: Are you expecting an incr frequency of storms?
A: Is your contingency plan su ur infrastructure reinforced?

Q: Are you expecting an increase in temperatures?
A: Are your surface materials adequate? Will demand change?

But – people and collaboration are key!

Different airports: different solutions…

Resources

- EUROCONTROL: Adapting Aviation to a Changing Climate https://www.eurocontrol.int/update/adapting-aviation-changing-climate
- ICAO Climate Adaptation Synthesis https://www.icao.int/environmental-protection/Pages/Climate-Adaptation.aspx
- Airports Council International (ACI) https://store.aci.aero/product/policy-brief-airports-resilience-and-adaptation-to-changing-climate/
- Airport Cooperative Research Programme https://www.icao.int/environmental-protection/Pages/Climate-Adaptation.aspx
- https://www.nap.edu/catalog/25327/using-existing-airport-management-systems-to-manage-climate-risk
- Existing Airport Climate Adaptation Plans

Supporting
European
Aviation

EUROCONTROL

Questions?

rachel.burbidge@eurocontrol.int

FOUNDING MEMBER SESAR JOINT UNDERTAKING

NETWORK MANAGER