

15:55-16:35 Presentation:

# Operation Blue Skies: A tangible plan for what to do now, in 5 years, and 10 years

**COPENHAGEN  
CONTRAILS  
CONFERENCE**  
25-26 March 2025 • Scandic Copenhagen



**Paul Hodgson**

*Director AIA,  
University of Cambridge*



**Matteo Mirolo**

*Head of Policy and Strategy  
Contrails, Contrails.org*



Sustainable Markets Initiative

Power Generation



Fuel Production



Distribution

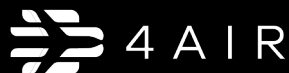


Journey



SYSTEM OF SYSTEMS

Our Partners



Aviation  
Impact  
Accelerator

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x

 Contrails.org

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# Operation Blue Skies

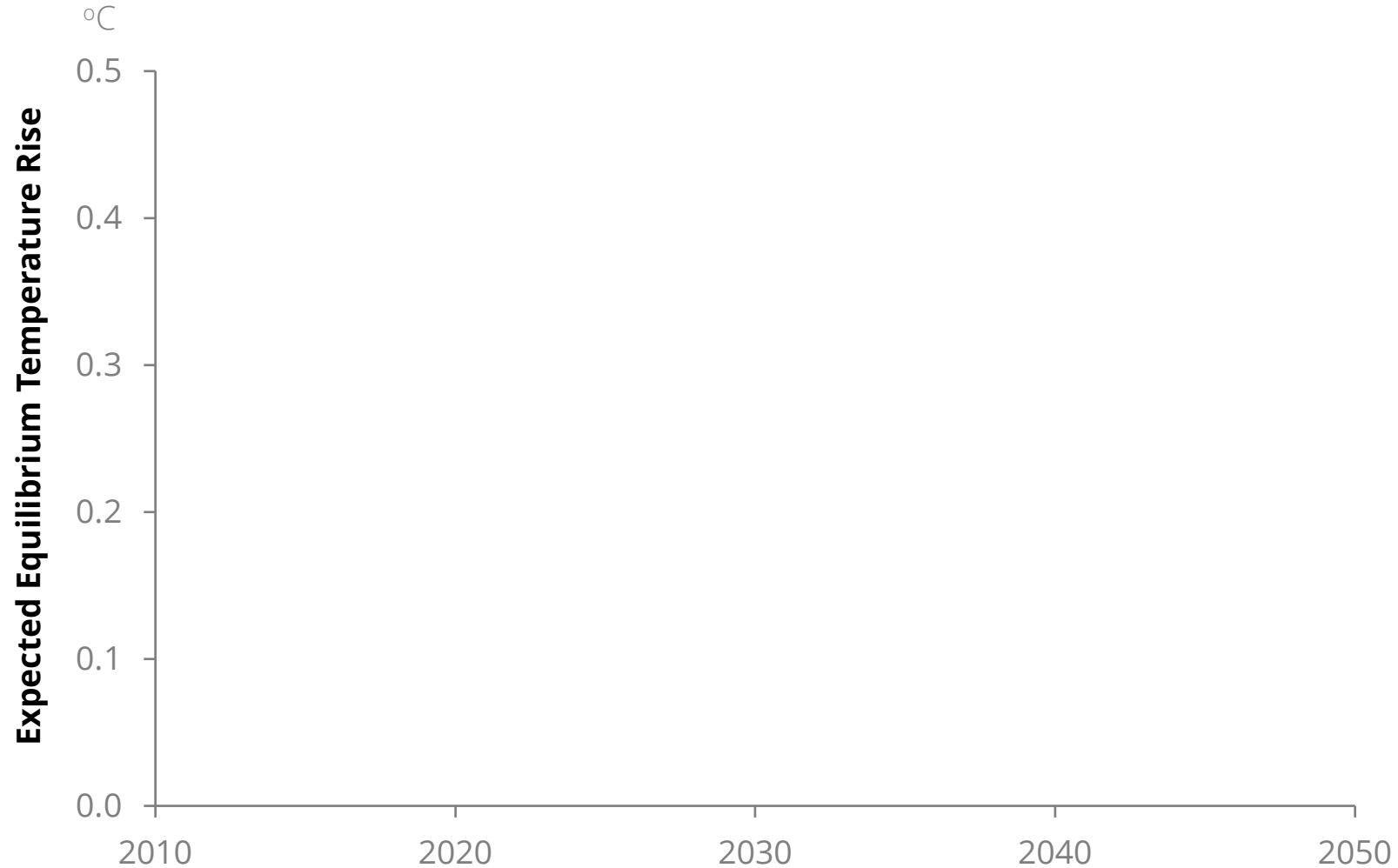


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# Contrails are a Major Barrier to Climate Goals

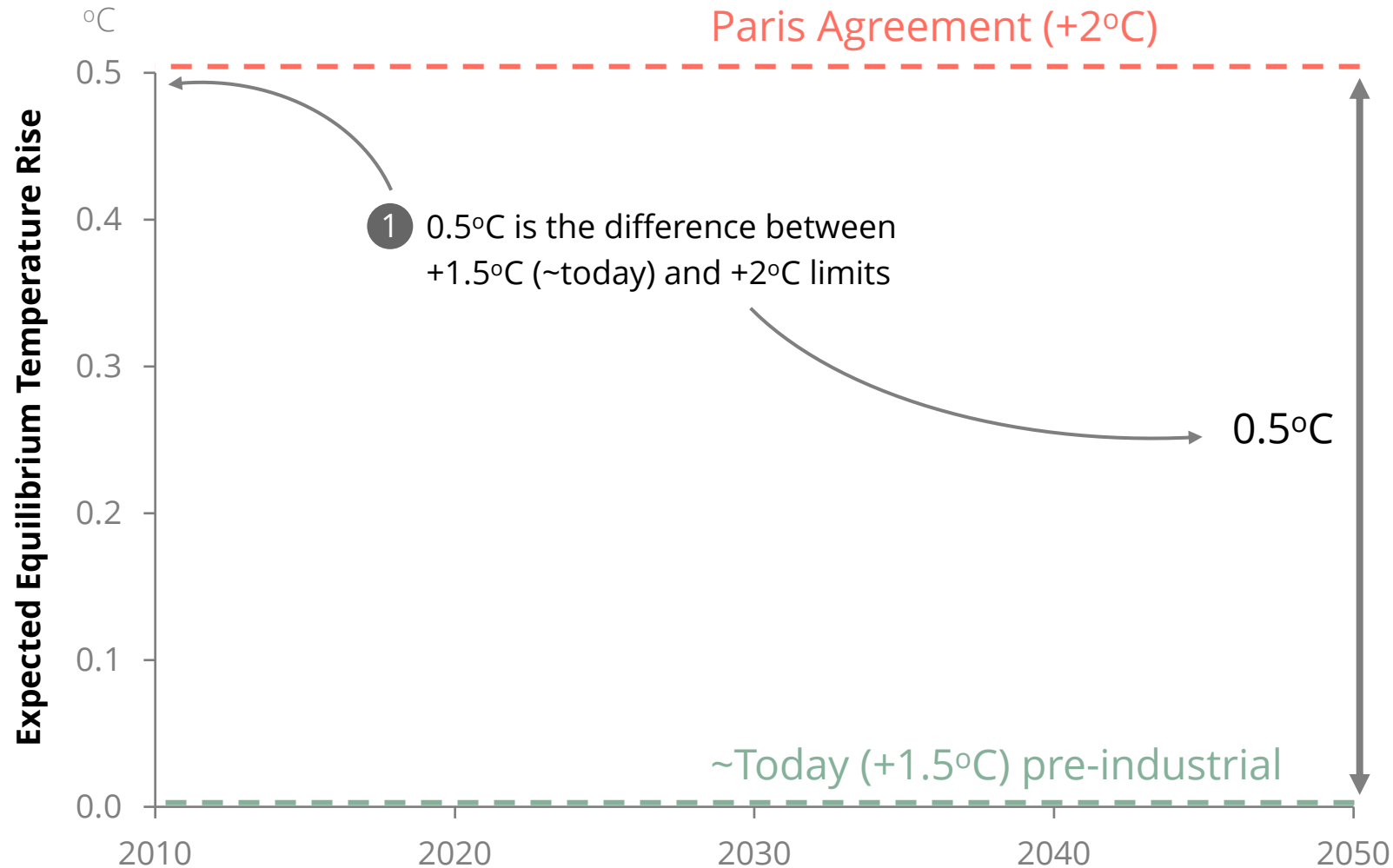
The contrail blanket covering Earth today keeps the planet  $\sim 0.05^{\circ}\text{C}$  warmer. By 2050 this likely will exceed  $0.1^{\circ}\text{C}$ . This is vast compared to aviation  $\text{CO}_2$  measures



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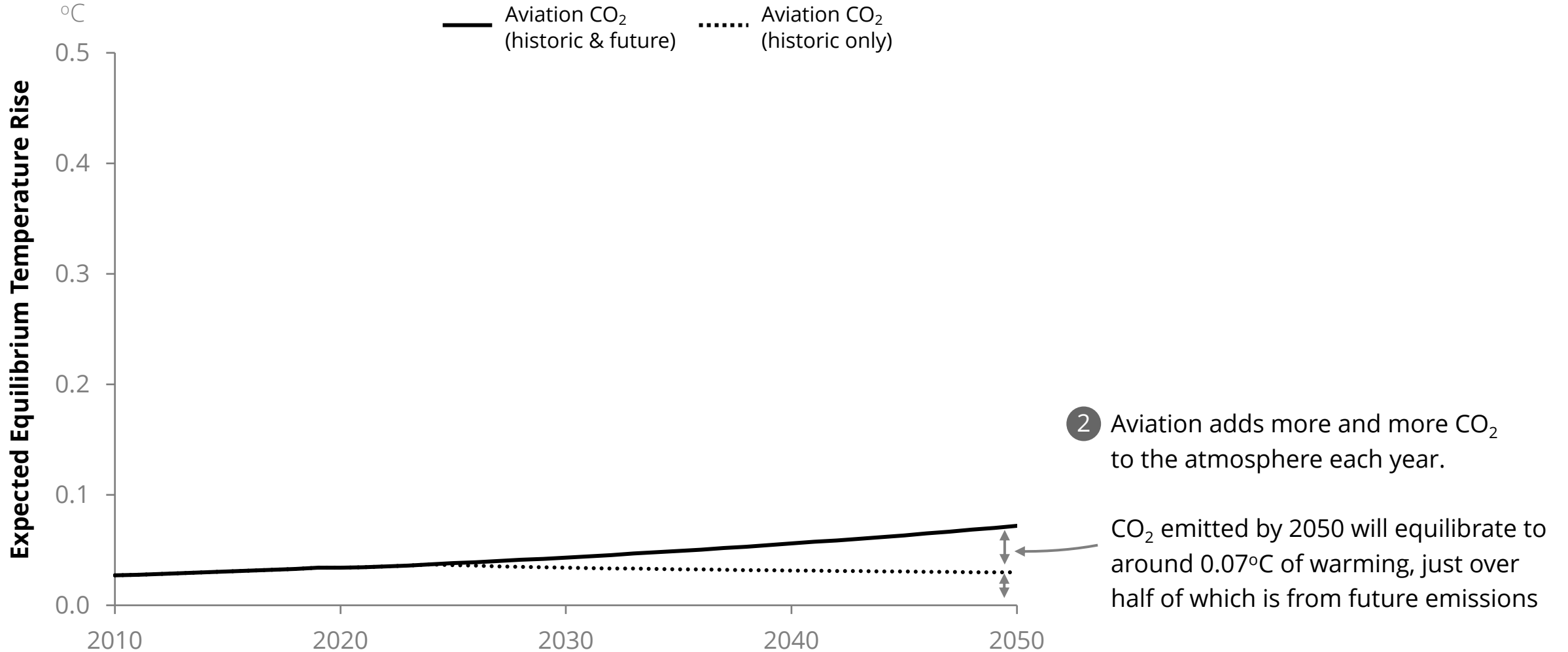
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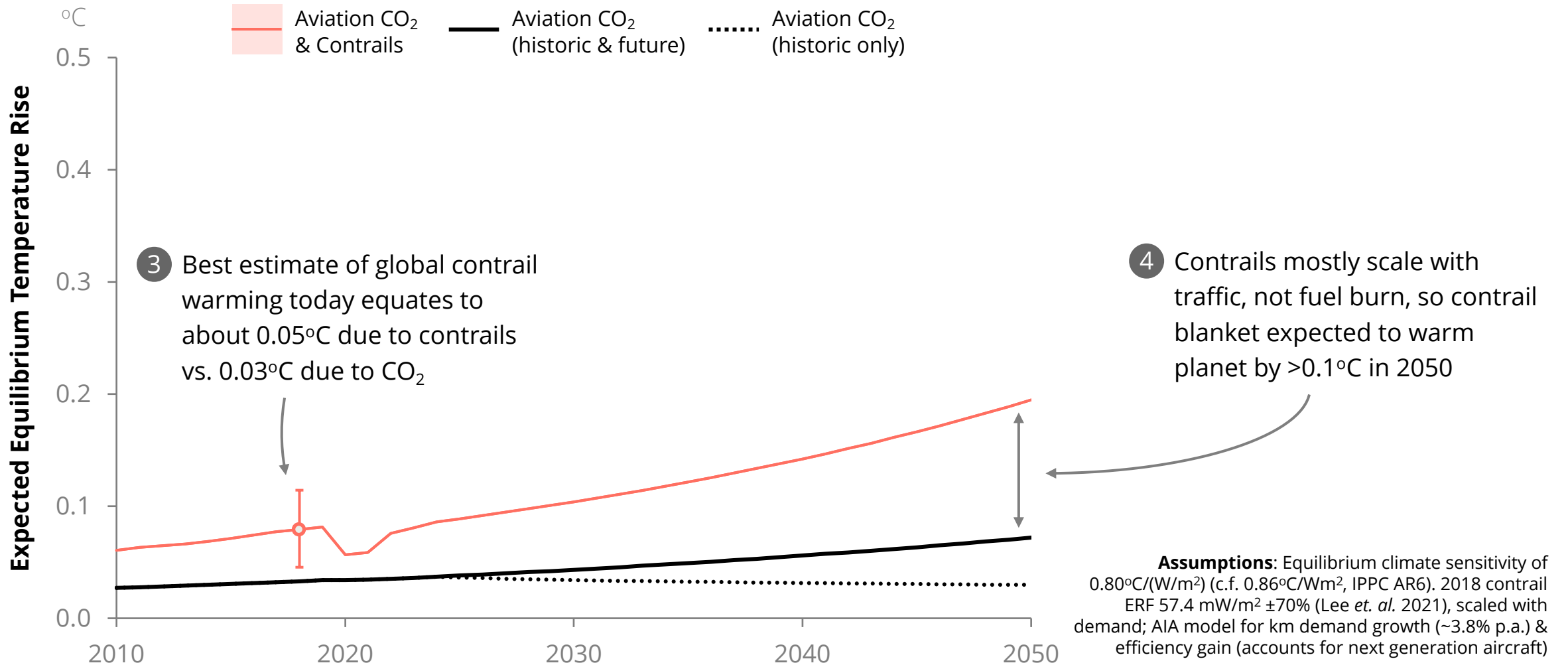
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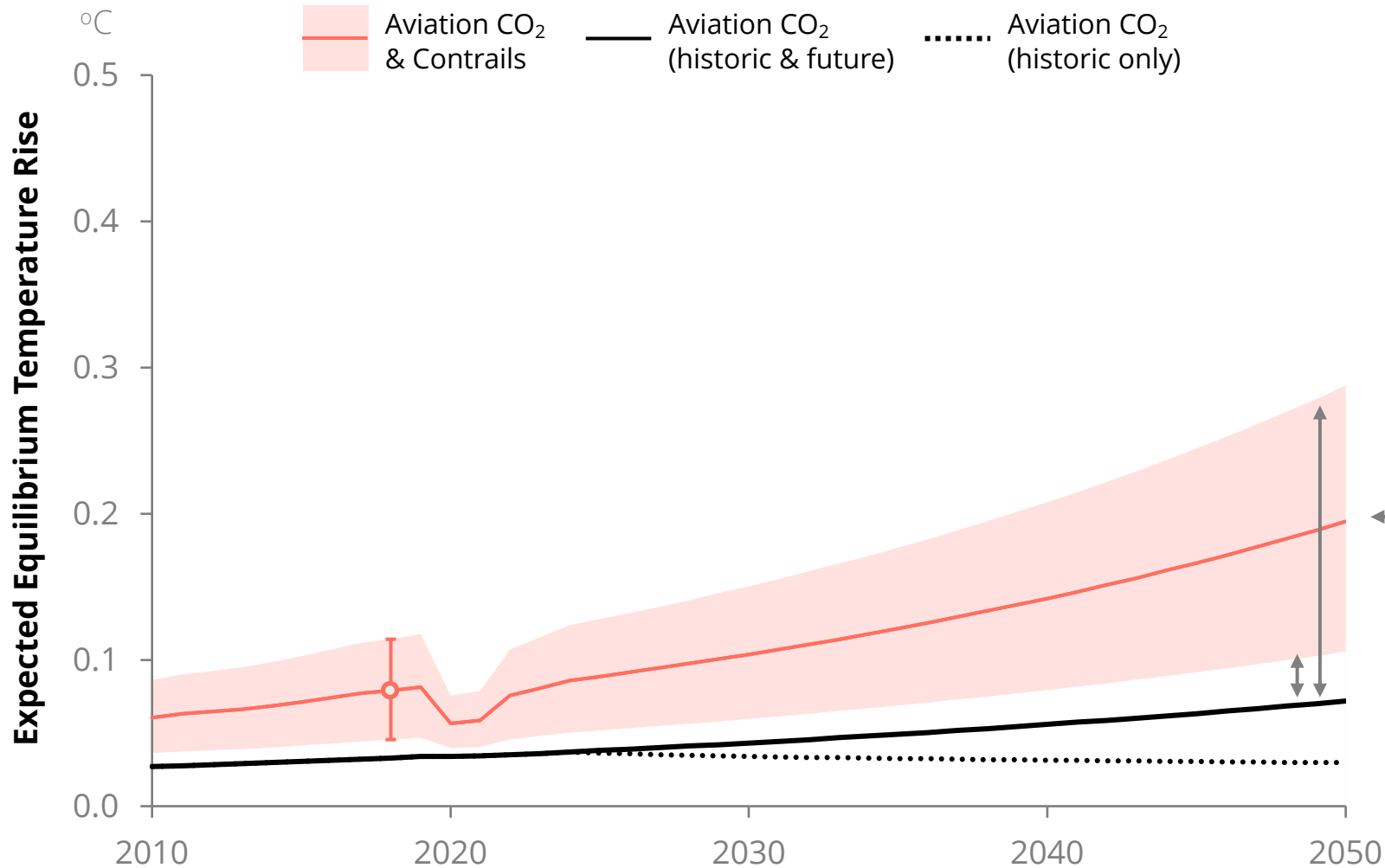




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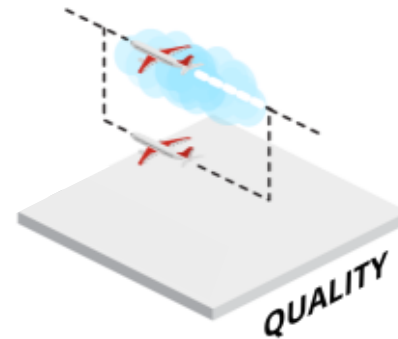
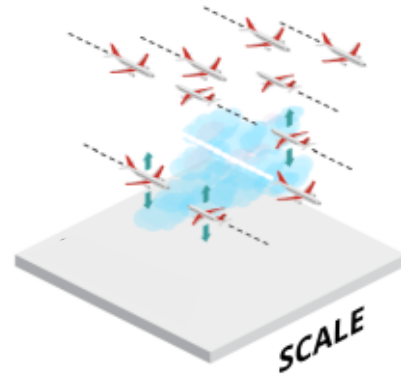


5 Global impact of contrails is uncertain – could be quite a big problem or a very big problem

**Assumptions:** Equilibrium climate sensitivity of  $0.80^\circ\text{C}/(\text{W}/\text{m}^2)$  (c.f.  $0.86^\circ\text{C}/\text{Wm}^2$ , IPCC AR6). 2018 contrail ERF  $57.4 \text{ mW}/\text{m}^2 \pm 70\%$  (Lee *et. al.* 2021), scaled with demand; AIA model for km demand growth ( $\sim 3.8\%$  p.a.) & efficiency gain (accounts for next generation aircraft)

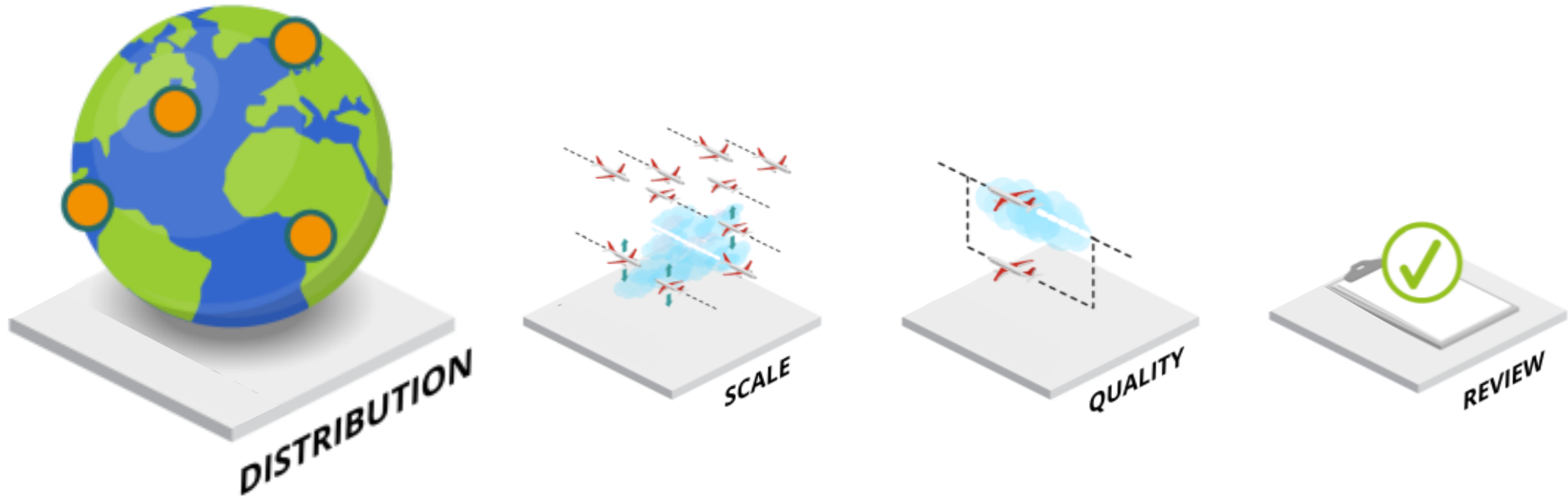
# Operation Blue Skies

Eliminating the climate impact of contrails is a systems problem. Accelerating action requires several Airspace-Scale Living Labs to learn-by-doing.



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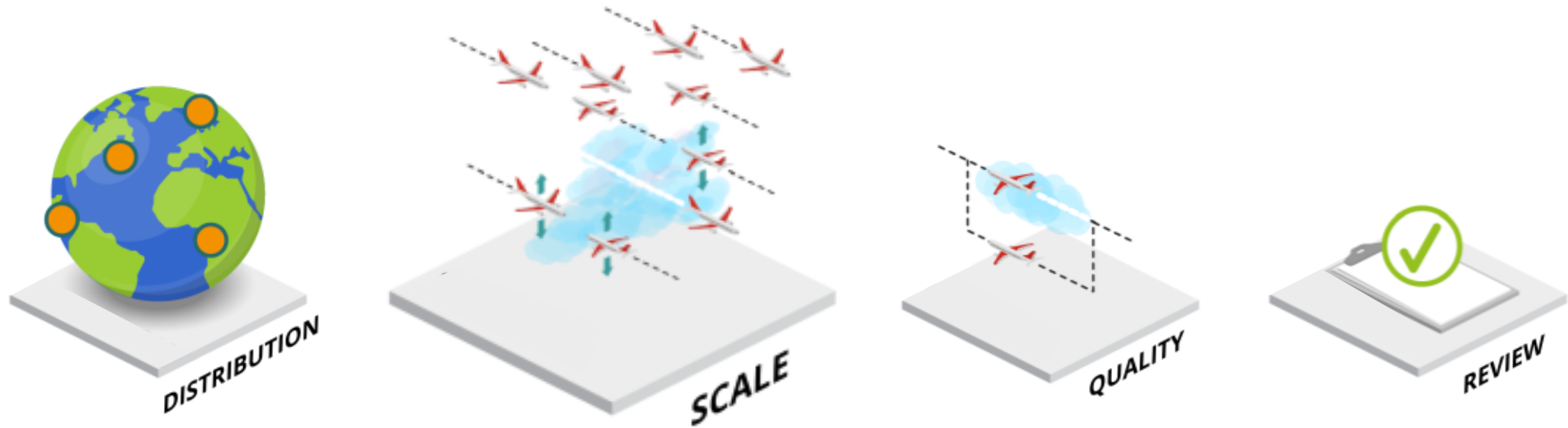


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**Distribution:** Several Labs (3-4) are required, strategically selected to represent diverse climate conditions, varying degrees of airspace congestion, and different regulatory landscapes

# Operation Blue Skies

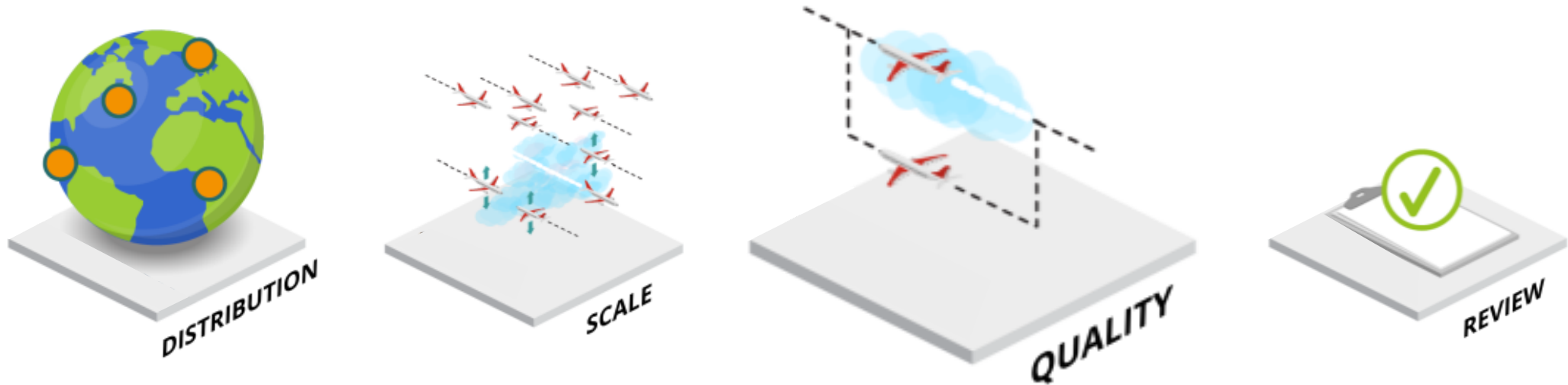
Eliminating the climate impact of contrails is a systems problem. Accelerating action requires several Airspace-Scale Living Labs to learn-by-doing.



- 2 Scale:** Each Lab must be at a scale that accurately replicates the real-world complexities of networks, air traffic control and aircraft proximity.

# Operation Blue Skies

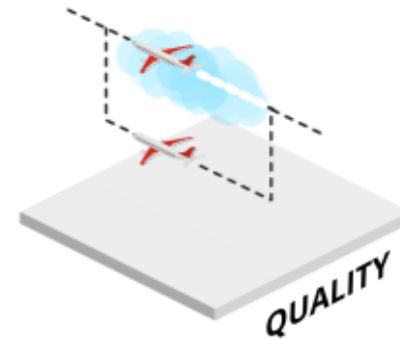
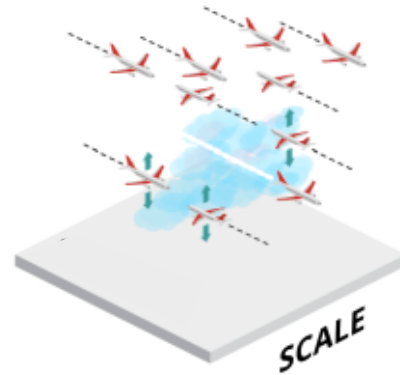
Eliminating the climate impact of contrails is a systems problem. Accelerating action requires several Airspace-Scale Living Labs to learn-by-doing.



- 3 **Quality:** Each Lab must be conducted in a way which ensures statistical significance, independent verification, and includes control aircraft

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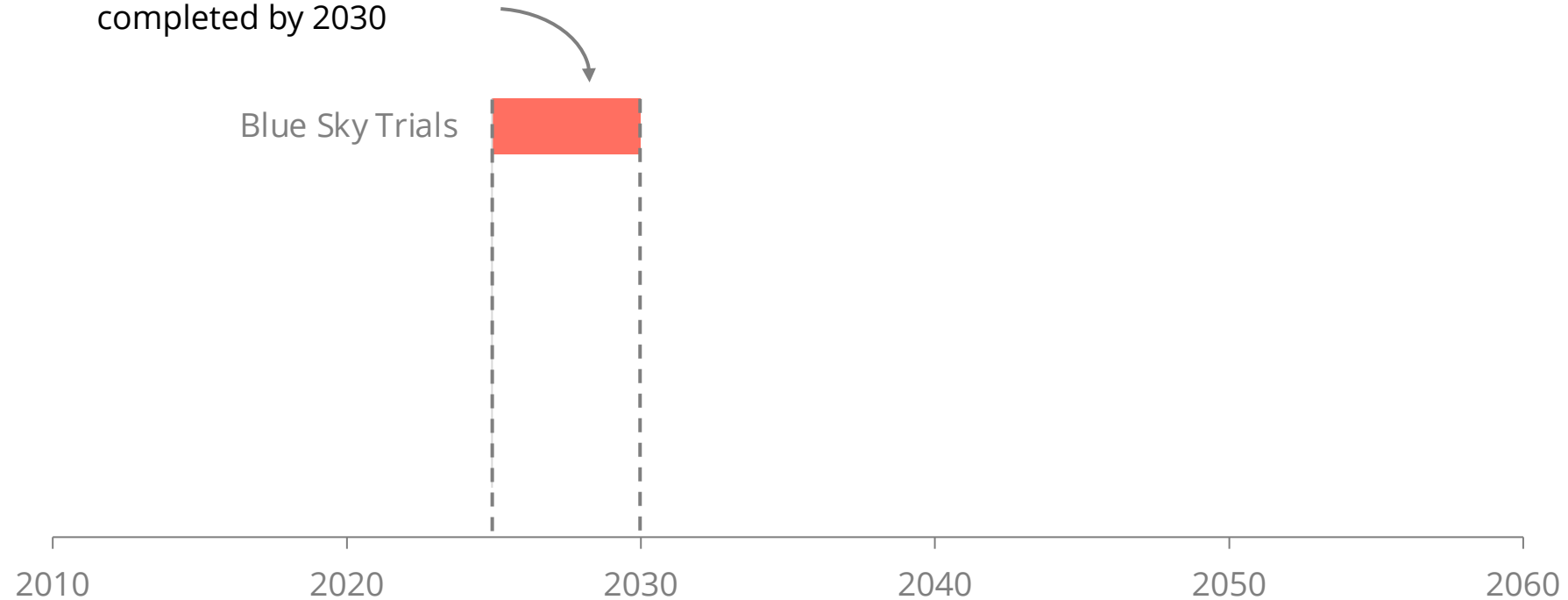
4

**Review:** A transparent review process must be set up for the Labs ranging from data sharing, peer review publications and oversight by independent non-governmental organisation.

# How Fast Can we Deploy Contrail Avoidance?

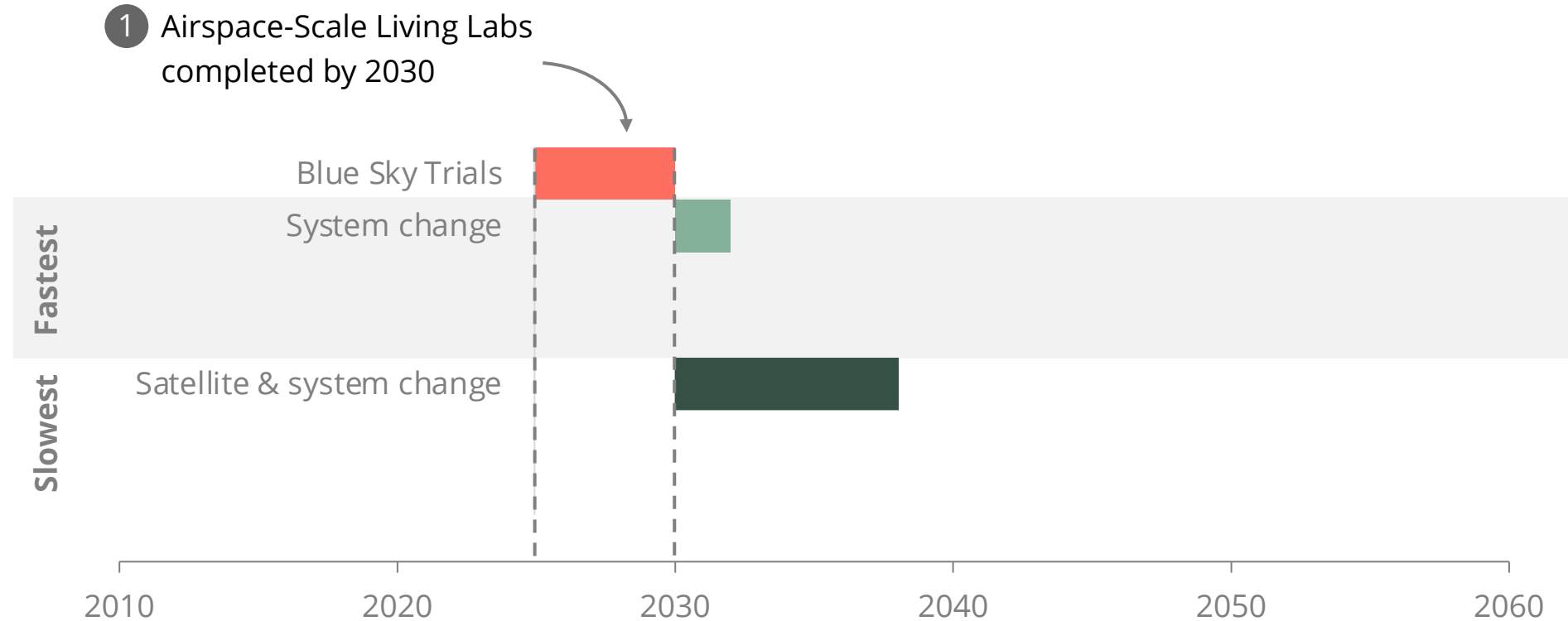
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- 1 Airspace-Scale Living Labs completed by 2030



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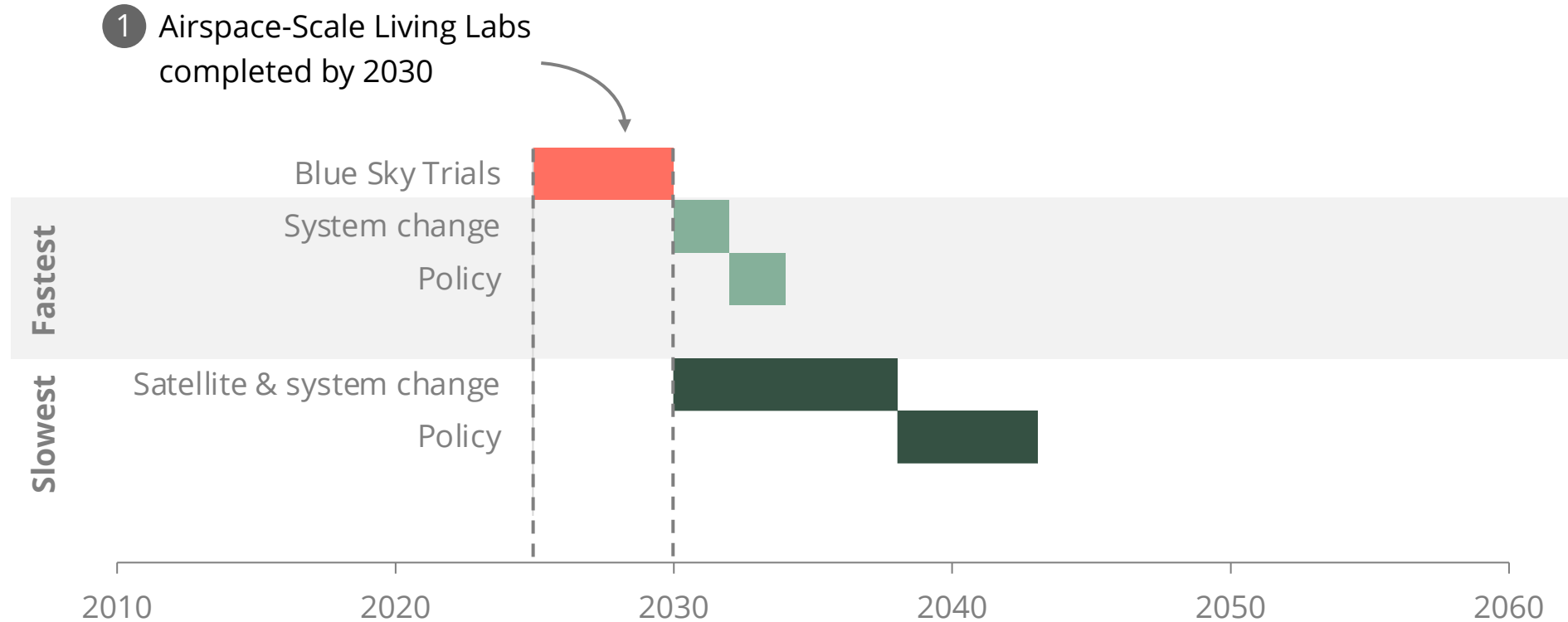
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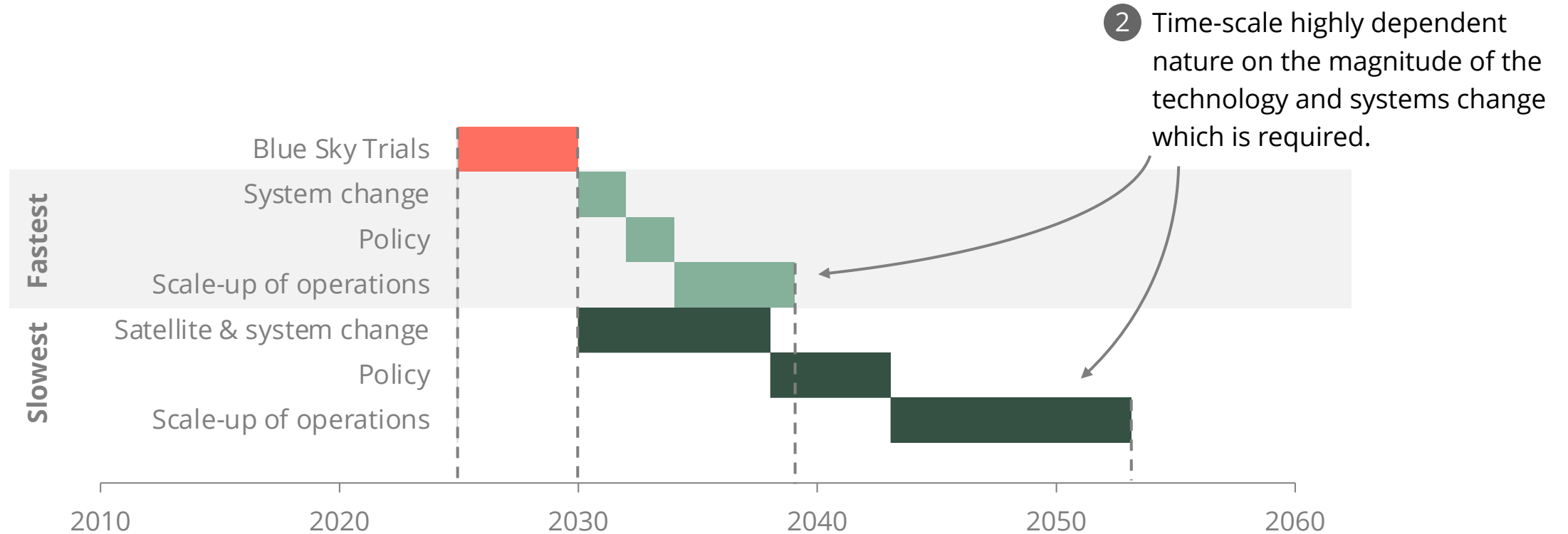
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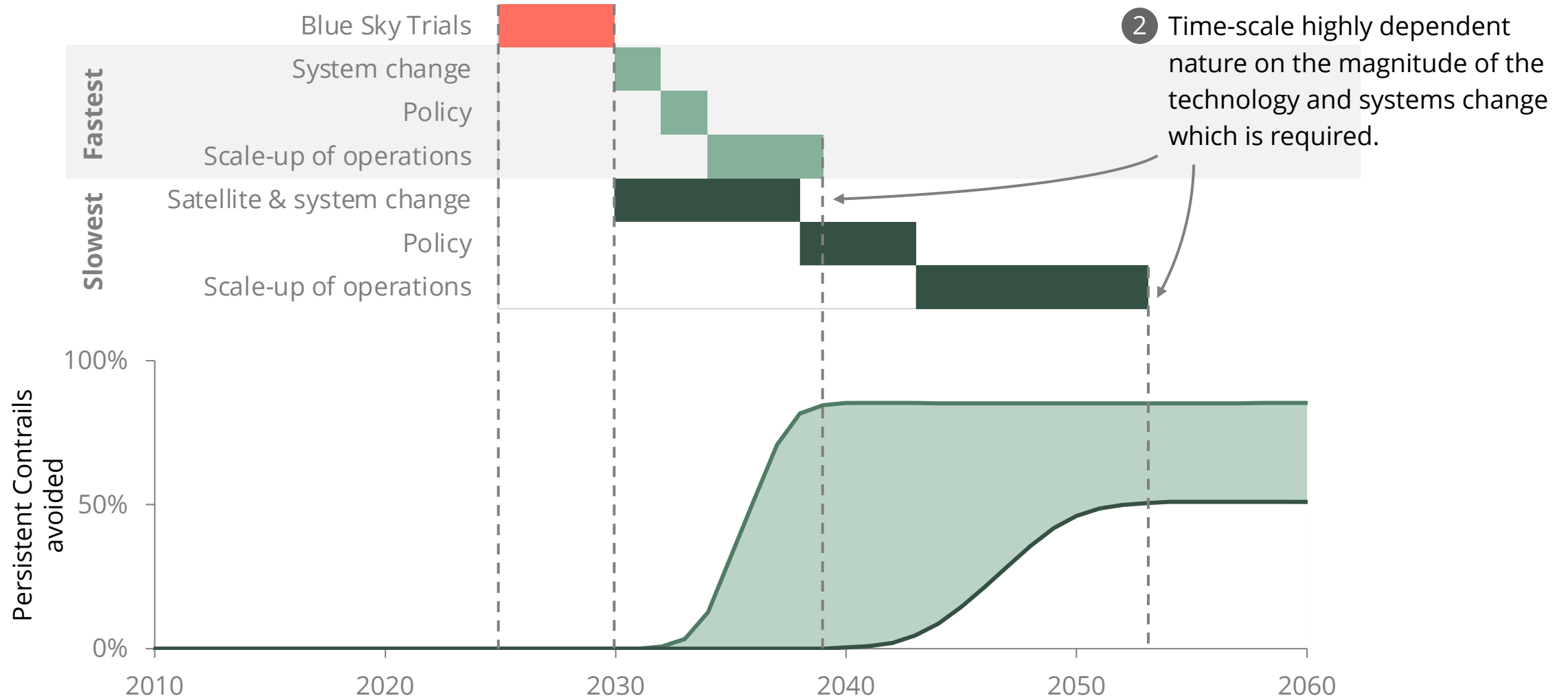
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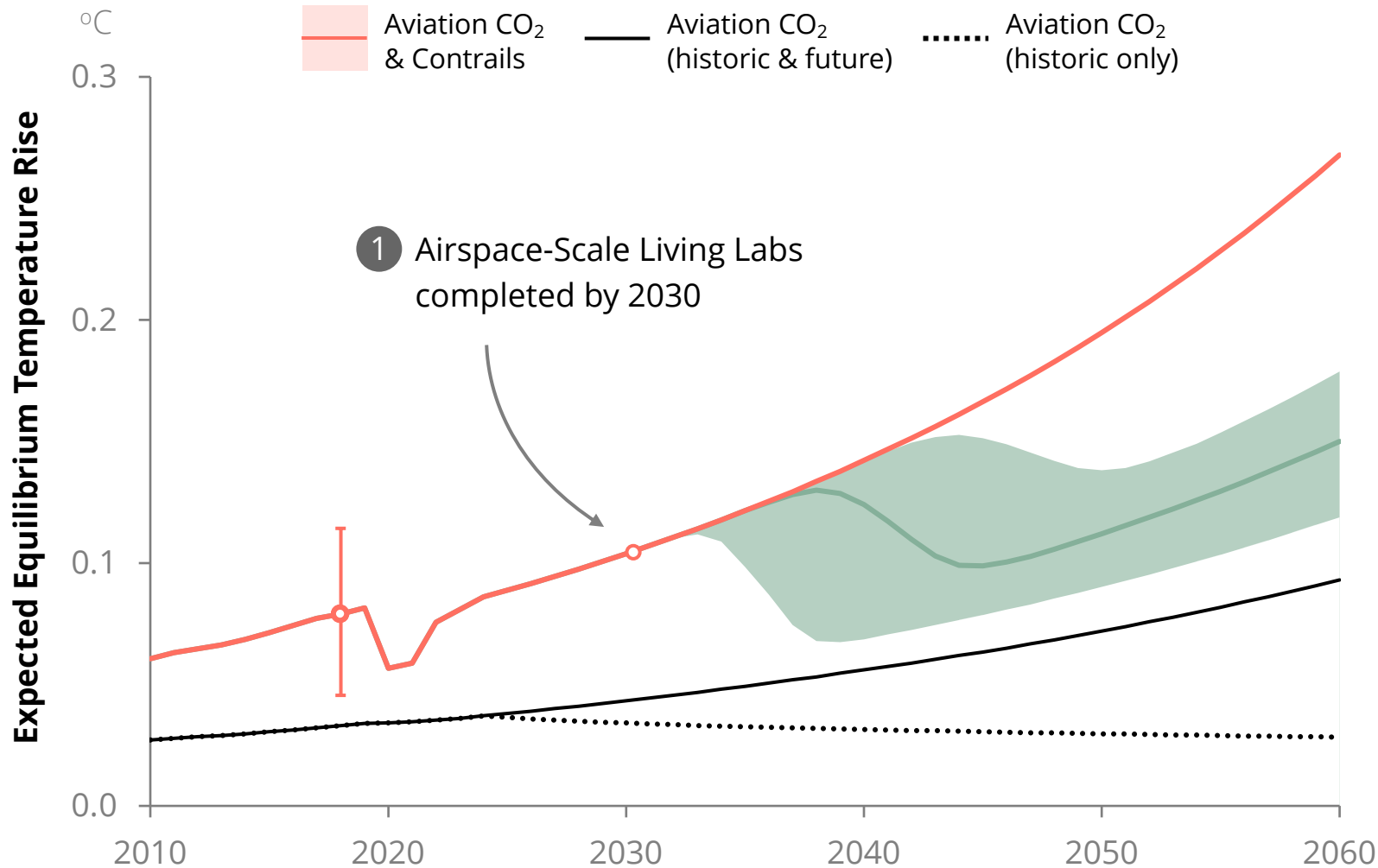
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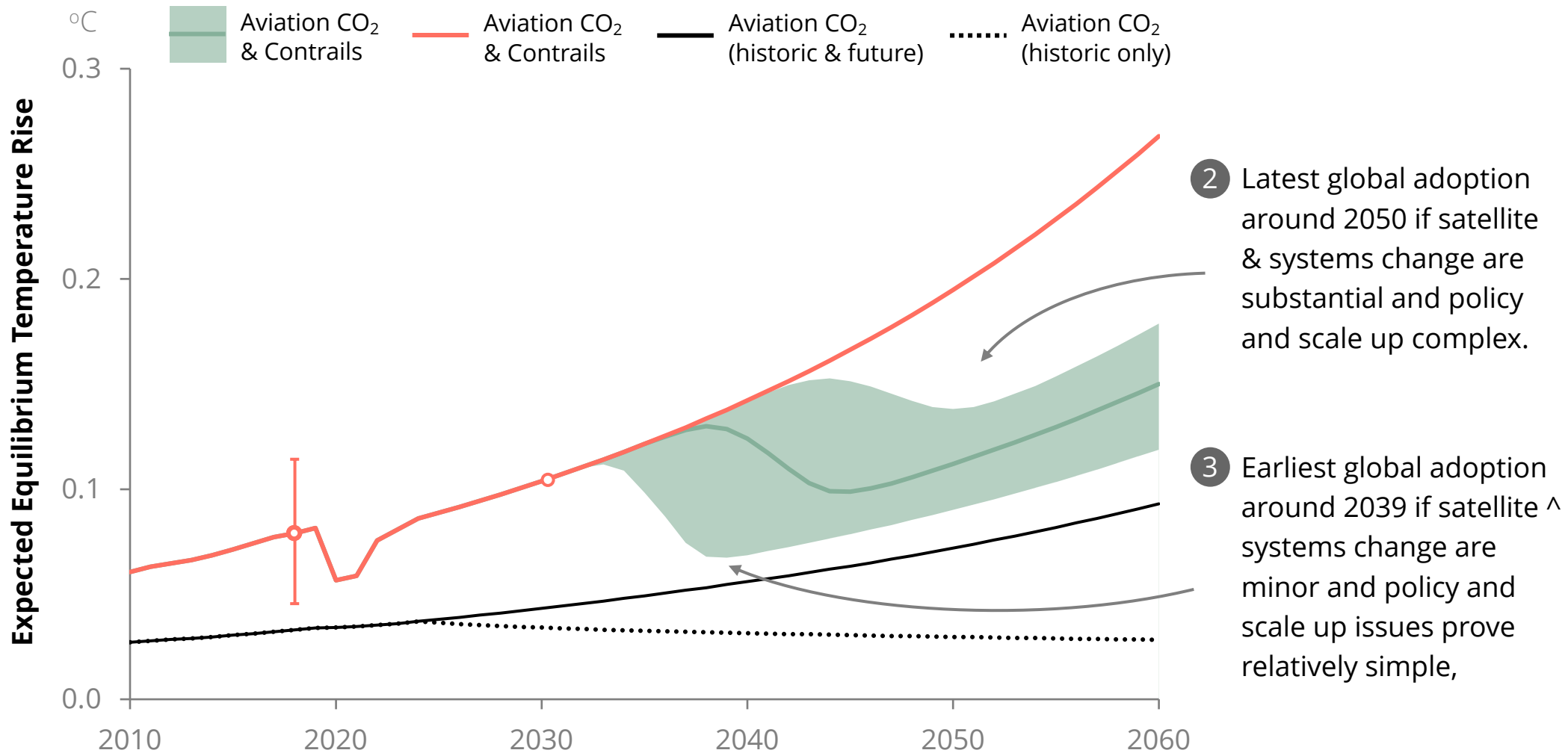
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**Myth #1:  
Aviation can  
only change  
slowly**





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1965**

Program starts  
Joe Sutter  
appointed  
Chief Engineer



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**June 17<sup>th</sup>  
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Break ground to  
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Credit: Boeing



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1970**

Entry-in-service,  
first flight,  
PanAm London  
– New York

**4 years 5 months**



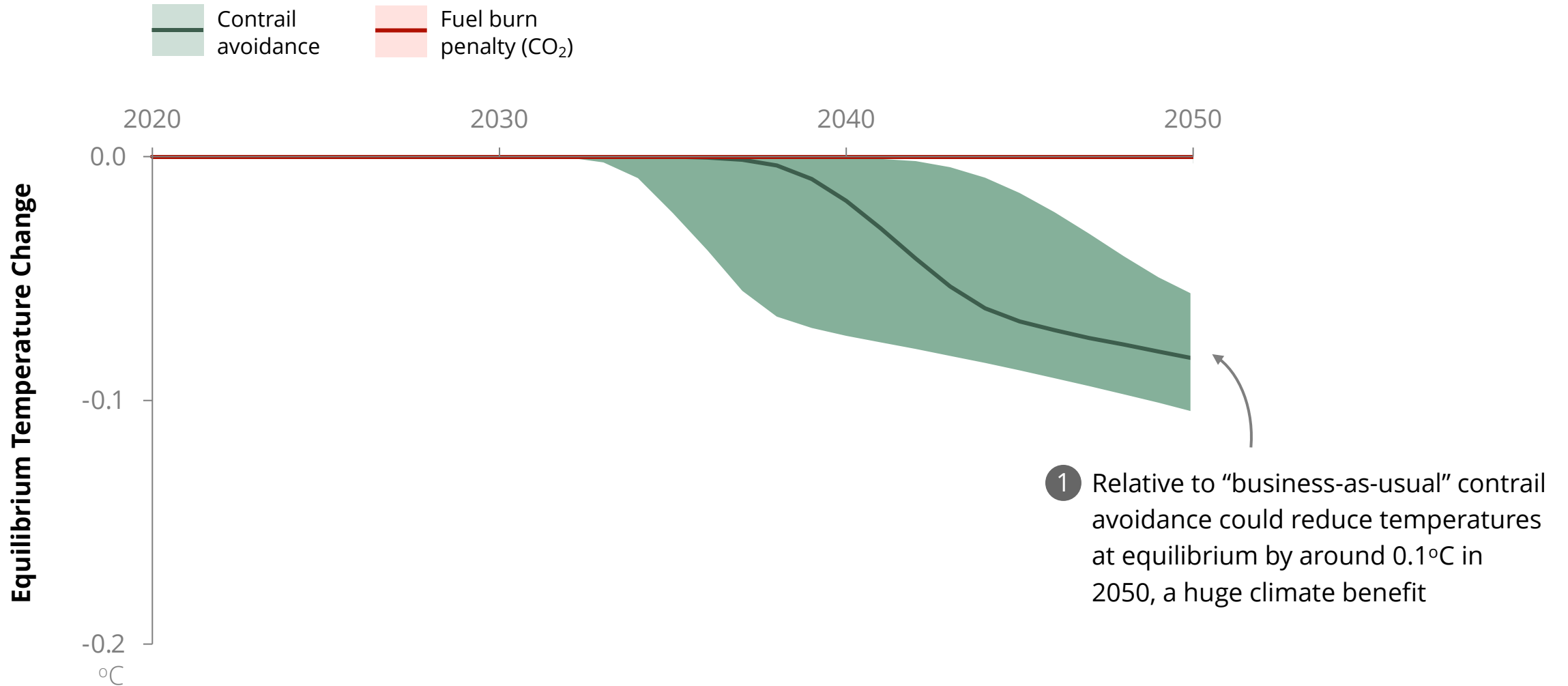
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**Myth #2:  
Additional  
fuel burn  
might  
outweigh  
the benefits  
of contrail  
mitigation**



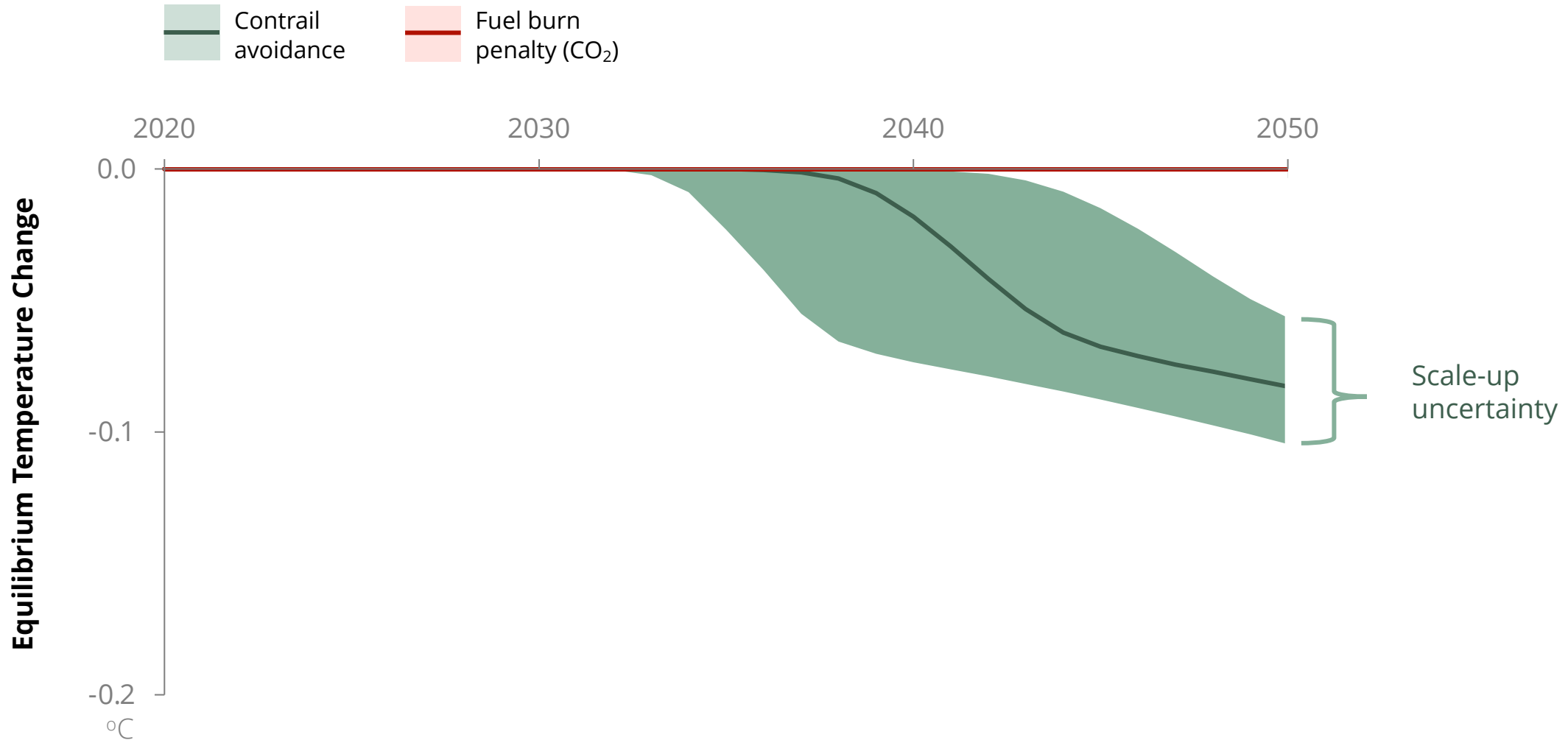
# What are the Risks of Delaying Action?

The highest warming impact of extra fuel burn is 100 – if not 1,000 – times smaller than the lowest savings made in contrail mitigation



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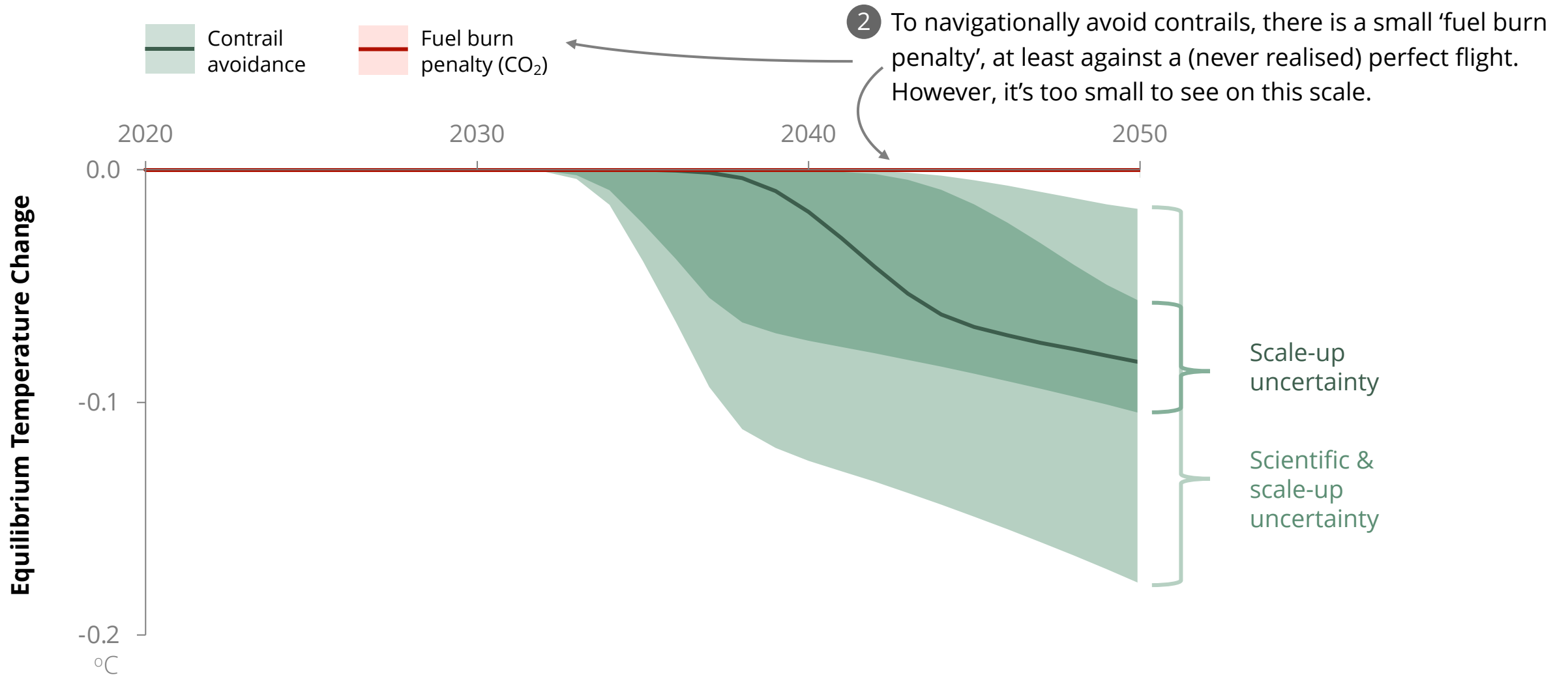
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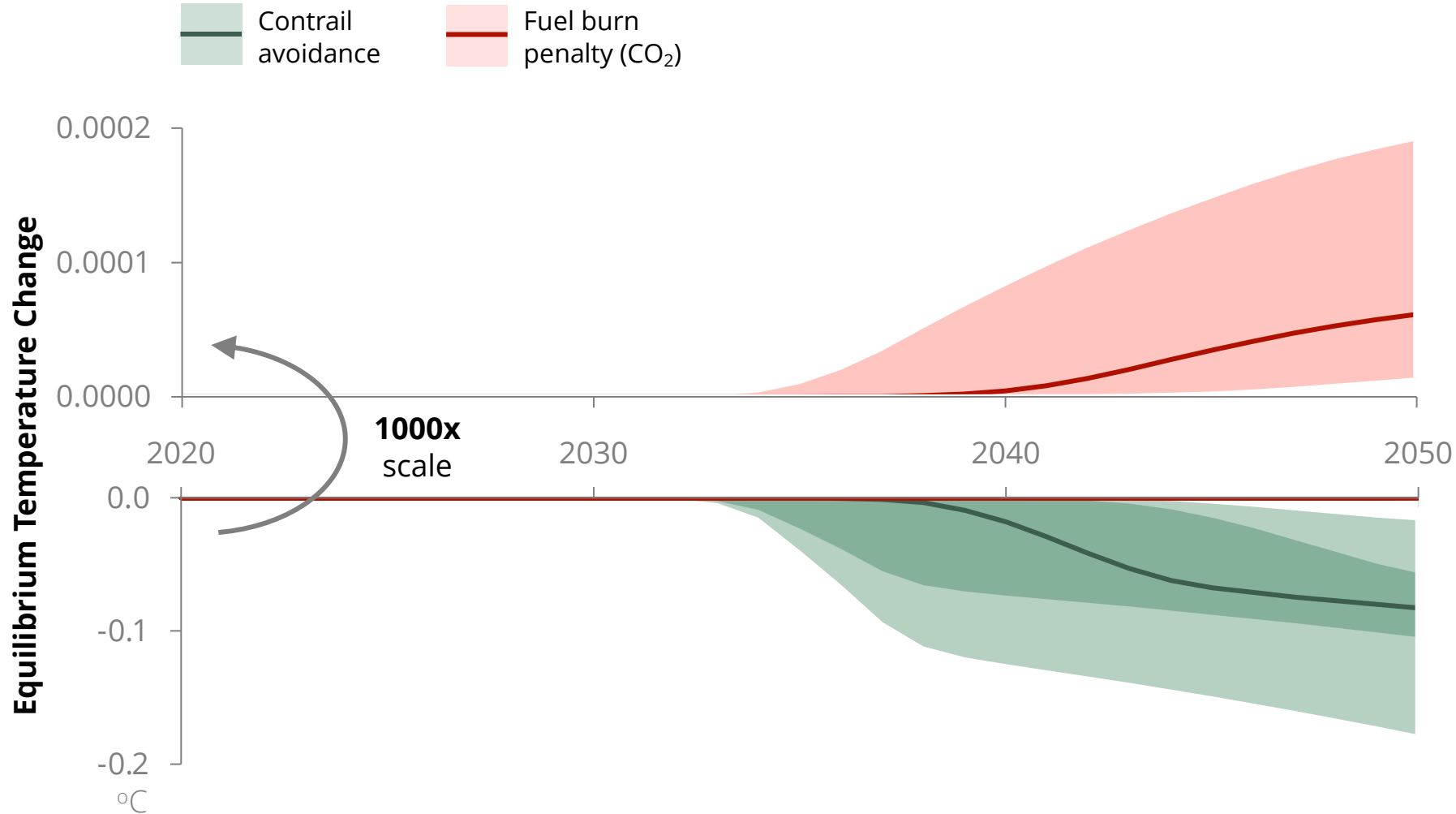
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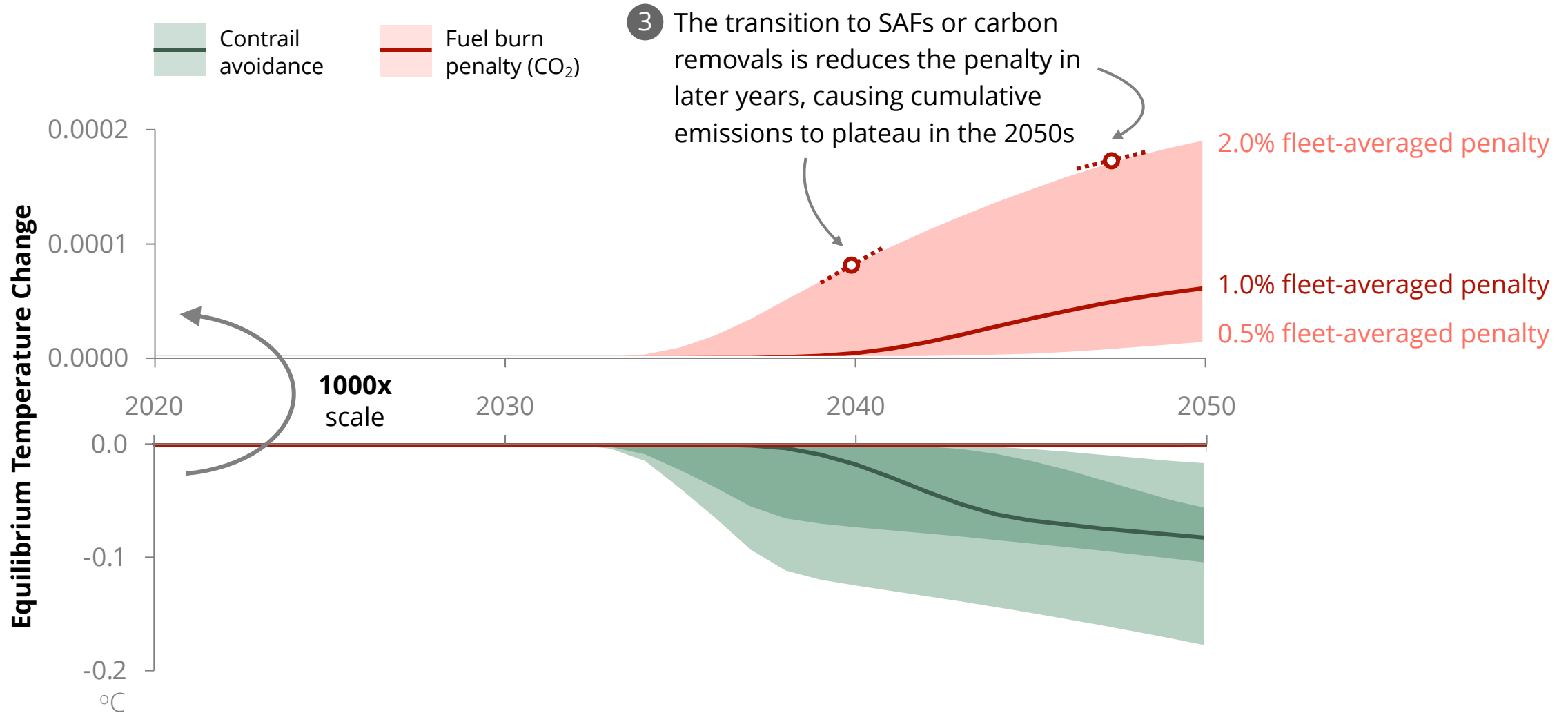
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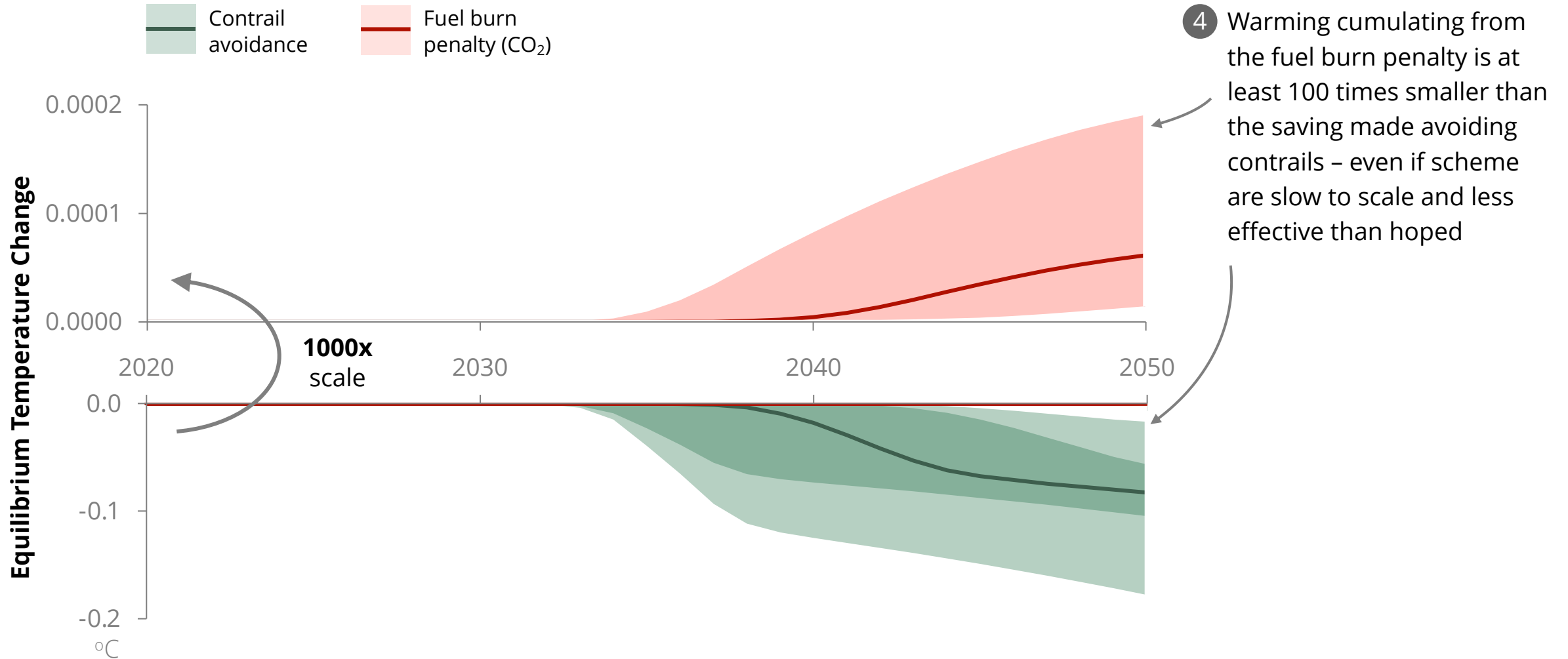
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# What are the Challenges for Implementation?

There are four areas where focus is required to accelerate implementation: congestion, incentives, measuring contrail absence & operational changes

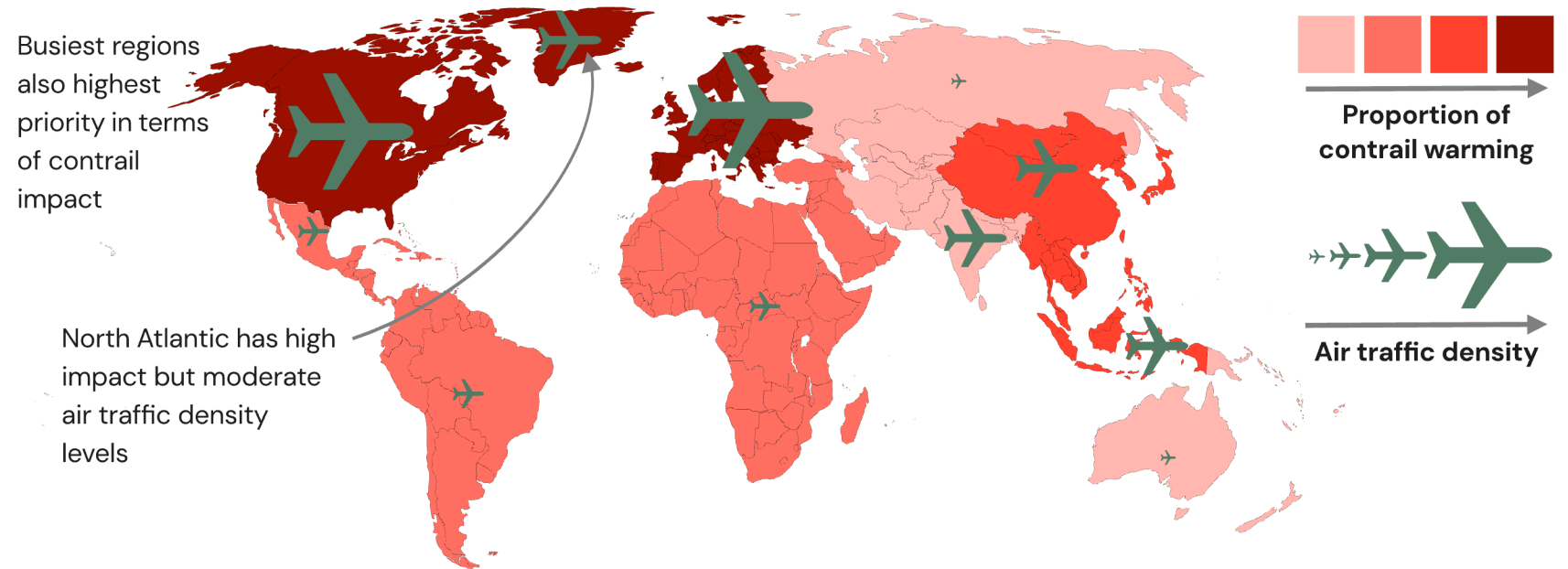
## 1 Congested Skies

1 Permission for avoidance could be limited in busy airspace. This could be alleviated by increased air traffic control capacity.

## 2 Incentivising Operators

## 3 Measuring the Absence of Contrails

## 4 Operational Changes



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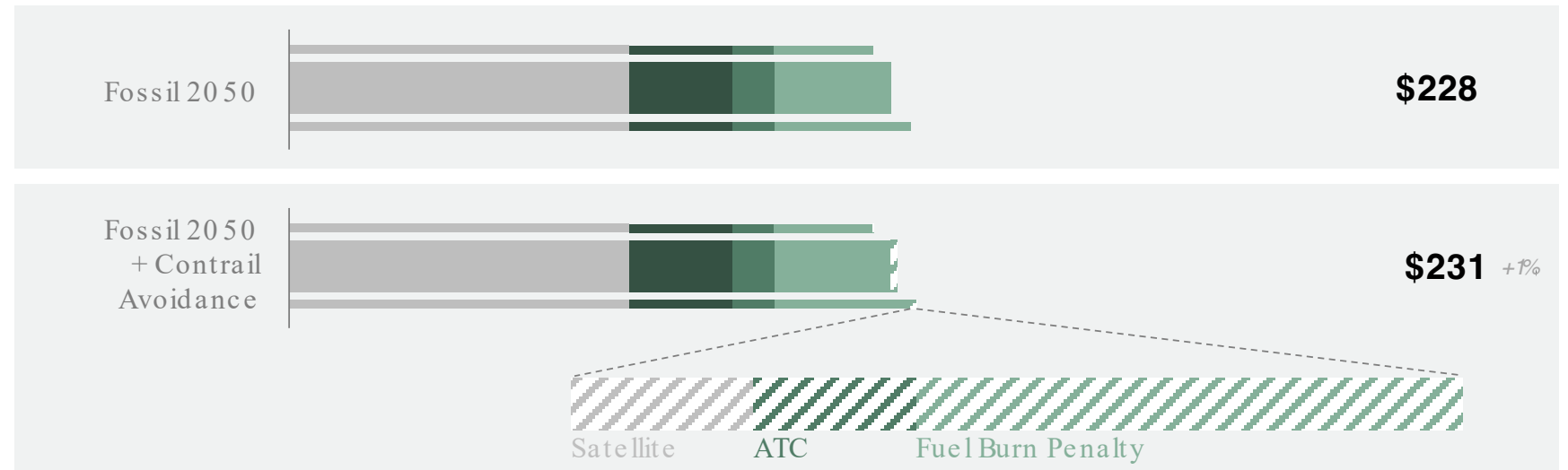
2 Although cost increases are modest (approximately 1% increase in ticket cost), they may deter action. This can be mitigated through regional or global incentivization schemes, or ANSP-led schemes.

## 2 Incentivising Operators

## 3 Measuring the Absence of Contrails

## 4 Operational Changes

Other Aircraft Airport Fuel

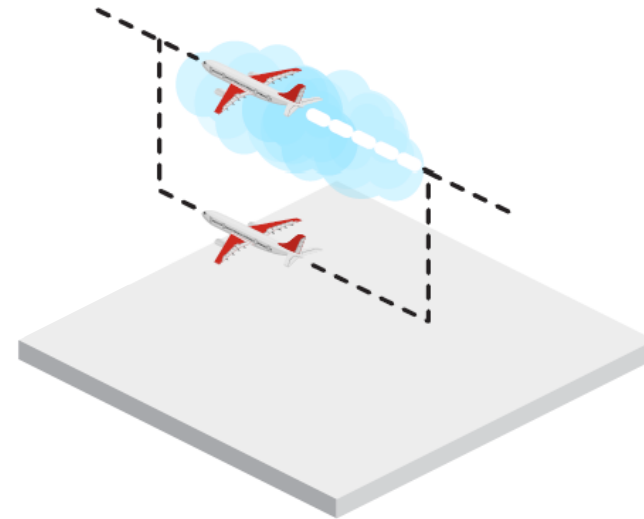


1 The cost of implementing contrail avoidance is likely to be very low, as only 1 in 20 to 25 kilometres flown requires an altitude change, with the additional fuel burn per manoeuvre being small.

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- 1 **Congested Skies**
  - 2 **Incentivising Operators**
  - 3 **Measuring the Absence of Contrails**
  - 4 **Operational Changes**
- 3 It is difficult to determine whether a contrail would have formed if no avoidance had been taken. This could be alleviated by penalising the formation of contrails or measuring contrail forming airspace.



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- 1 **Congested Skies**
  - 2 **Incentivising Operators**
  - 3 **Measuring the Absence of Contrails**
  - 4 **Operational Changes**
- 4 Contrail mitigation necessitates altering the behaviour of thousands of individuals and the systems they use. This will require both new systems and comprehensive retraining, and education for buy-in



Flight planners



Pilots



Air Traffic Controller



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# Myth #3: Contrails are too complex to solve





**Credit: Rolls Royce**

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