# Council – 225th Session

**Subject No. 50: Questions relating to the environment**

# Analyses in Support of the 2022 CORSIA Periodic Review:
## Focus on costs to States and operators

Presented by CAEP

# Questions Addressed at the 225th Council Session

## The Council requested CAEP to present the following inputs for the review, as outlined in the C-DEC 222/12 and the CORSIA Periodic Review Terms of Reference:

*Excerpt from C-DEC 222/12 reference: 10. f. iii.*

**Question 1:** **Analyses of forecast prices for CORSIA eligible emissions units through 2026, while drawing upon input from TAB on unit supply;**

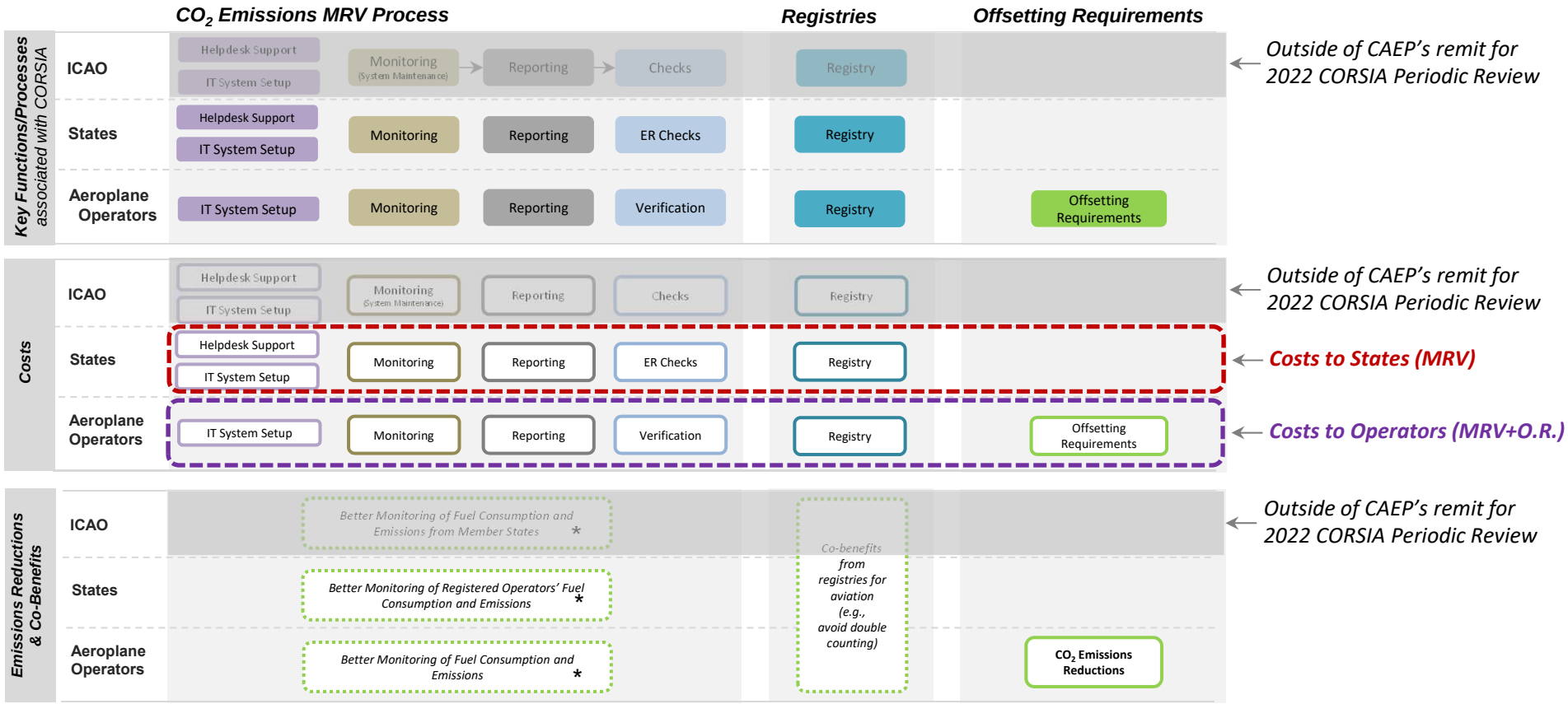
*Excerpt from C-DEC 222/12 reference: 10. g. ii.*

**Question 2:** **CAEP's analysis of administrative costs for the implementation of CORSIA, for aeroplane operators and States, drawing upon the analysis undertaken by CAEP prior to adoption of Annex 16, Volume IV, and relevant information from States as a result of State letter consultation process;**

*Excerpt from C-DEC 222/12 reference: 10. f. i.*

**Question 3:** **Assessment of CORSIA's […] cost impact on States and aeroplane operators and on international aviation […];**

# Scope of key functions and processes associated with CORSIA and identification of costs, emissions reductions and co-benefits




* Qualitative co-benefits (not quantified/assessed in this analysis)

# Question 1:

## Estimation of Costs from Emissions Units

Analyses of forecast prices for CORSIA eligible emissions units through 2026, while drawing upon input from TAB on unit supply;

# Supply of Emissions Units and Estimates of Price

- CAEP compiled existing data on historical weighted average prices for carbon offsets similar to CORSIA eligible emission units, transacted voluntarily between 2015-2021.
- Volume weighted averages aggregate a wide range of prices that uniquely vary by, e.g., project attributes (sector or type, size, non-$CO_2$ e benefits, geography, methodology), emissions unit programme, and vintage, as well as contractual
- Several factors make this task significantly challenging:
  - The nascent stage of the market for CORSIA eligible units.
  - In recent years, the majority of carbon offset transactions are undertaken over the counter, making price discovery information largely opaque.
  - Lack of open access platforms with robust data on price of carbon offsets for this market.
    - The recent collaboration between the ICAO Secretariat and Forest Trends' Ecosystem Marketplace provides a new source of data on carbon market transactions of CORSIA eligible emissions units through the CORSIA Newsletter.
  - The updated NDC commitments and recent decisions taken by Parties to the Paris Agreement at Glasgow under the UNFCCC are expected to have an impact on supply and demand in the future, and therefore also impact price. However, the precise contours of those impacts remain substantially unclear.

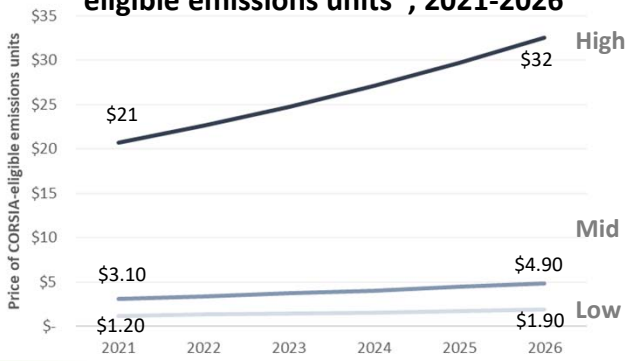
# Supply of Emissions Units and Estimates of Price

- **Results of scenario-based analysis using available historical data of voluntarily transacted offsets to provide indicative low, medium, and high price estimates for CORSIA eligible emissions units from 2021 to 2026.**
  - **Low price scenario: lowest volume-weighted price by project type in 2021: $1.19** (CORSIA Newsletter)
  - **Mid price scenario: global average price for voluntarily transacted offsets: $3.08** (CORSIA Newsletter)
  - **High price scenario: highest volume-weighted price by project type: $20.67** (CORSIA Newsletter)
  - **Assumed 9.5% year on year increase in emission unit prices (per tonne) across all scenarios**
  - **Between January 2020 through November 2021 CORSIA eligible units have transacted at significantly different prices ranging from less than USD 0.50/$tCO_{2eq}$ to more than USD 45.00/tCO2eq.** (CORSIA Newsletter)
  - **Price of carbon offsets are consistently influenced by the size and type of transactions, e.g., compliance vs. voluntary, among other factors.**

## Caveats:

- **These scenario-based price estimates are based on available historical data on price of voluntarily transacted offsets and the CORSIA Newsletter (Nov. 2021) on carbon market transactions of CORSIA eligible emissions units.**
- **These scenario-based price estimates are not indicative of future prices. CAEP continues to monitor additional price information and stands ready to respond to future requests from Council.**
- **At this moment it is not possible to quantify the potential impact that Host Party accounting for internationally transferred mitigation outcomes may have on price, emerging voluntary "net zero" corporate targets, and other factors outside of ICAO.**

**CAEP/12 Scenario-based price of CORSIA-eligible emissions units*, 2021-2026**



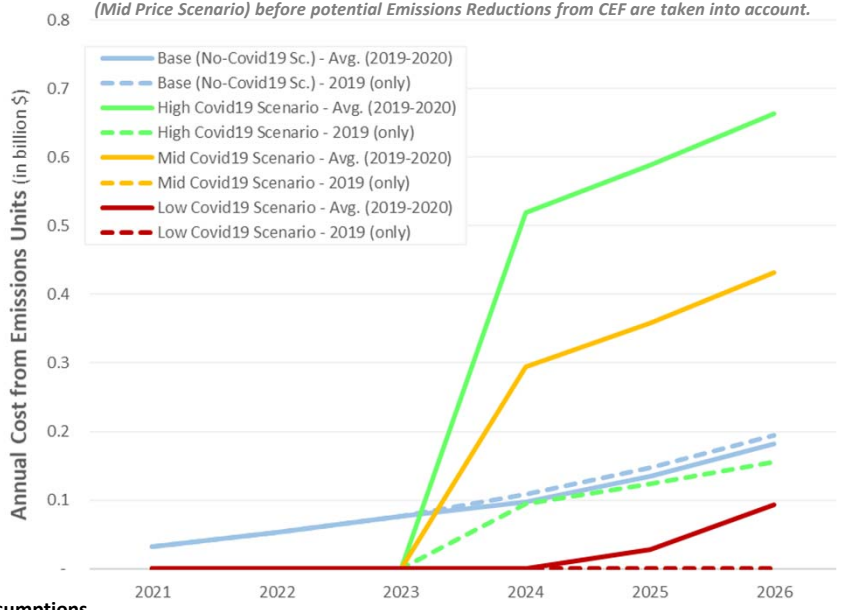

* ICAO, CORSIA Newsletter, November 2021, available at: www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Newsletter_Nov_2021.pdf

** As background, CAEP/10 scenarios for price of emissions units assumed; IEA High scenario $20 in 2021 and $27.8 in 2026, IEA Low scenario $8.7 in 2021 and $12.2 in 2026, and Alternative Low scenario $6.4 in 2021 and $8.4 in 2026.
Reference: ICAO Environment Advisory Group Meeting (EAG/15), January 20-21, 2016 available at: www.icao.int/Meetings/HLM-MBM/Documents/EAG15_CAEP%20Technical%20Analyses.pdf

# Estimations of Costs Associated with Offsetting Requirements through 2026

- **Cumulative cost from emissions units could range from $0.1 to 1.8 billion and $0 to 0.4 billion under an Average 2019-2020 baseline and 2019 baseline respectively (for mid-price scenario). For context and order of magnitude comparison, the global (domestic and international) aviation industry cumulative revenues** from 2015-2020 was ≈ $3,700 billion.**
- **Total cost can vary due to price of emissions units and be reduced (by $80-530 million) if emissions reductions from CEFs are claimed.**

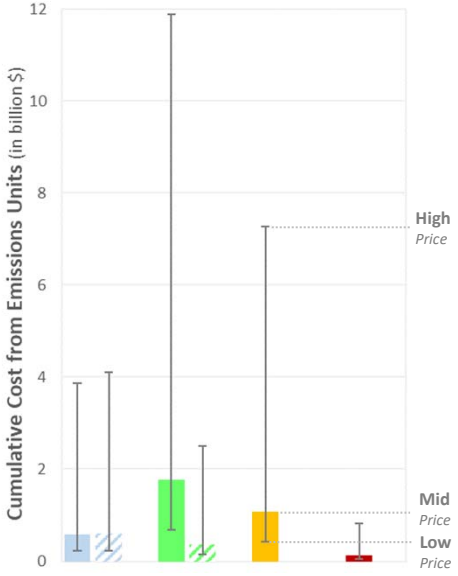
**Annual Cost of Emissions Units**
**= Offsetting Requirements * Price CORSIA Eligible Emissions Units**
*(Mid Price Scenario) before potential Emissions Reductions from CEF are taken into account.*



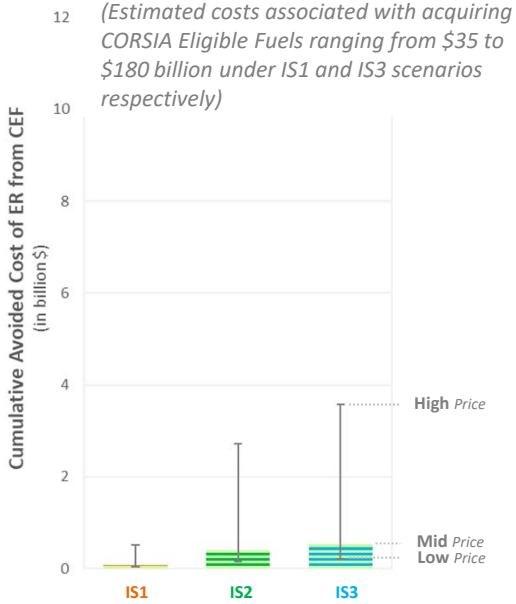

**Assumptions**

| | | | | | | |
|---|---|---|---|---|---|---|
| Mid Price | $3.08 | $3.37 | $3.69 | $4.04 | $4.43 | $4.82 |

**Cumulative Cost of Emissions Units**
*from 2021 to 2026*




**Cumulative Avoided Cost of Emissions Reductions from CEFs***
*from 2021 to 2026*
*(Estimated costs associated with acquiring CORSIA Eligible Fuels ranging from $35 to $180 billion under IS1 and IS3 scenarios respectively)*



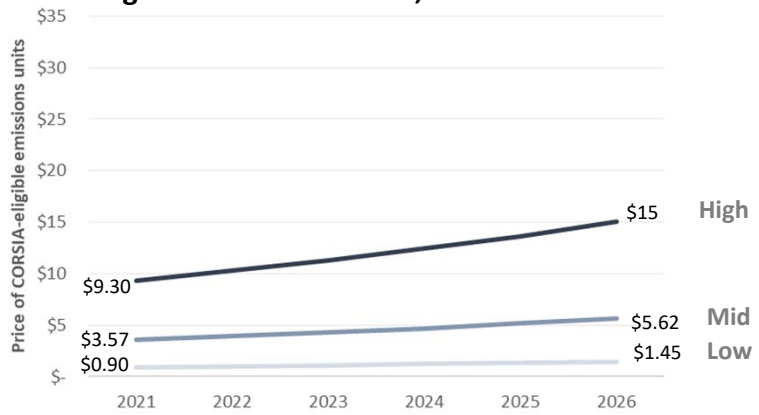

** Cumulative avoided costs of emissions reductions from CEFs represent the costs avoided if Emissions Reductions from CEF were not claimed under CORSIA and Emissions Units were used to meet offsetting requirements.*
***Reference: IATA, Industry Statistics, Fact Sheet, available at: www.iata.org/en/iata-repository/pressroom/fact-sheets/industry-statistics/*

# Updated Results in Context of Council 223 Estimates

**Price** of Emissions Units

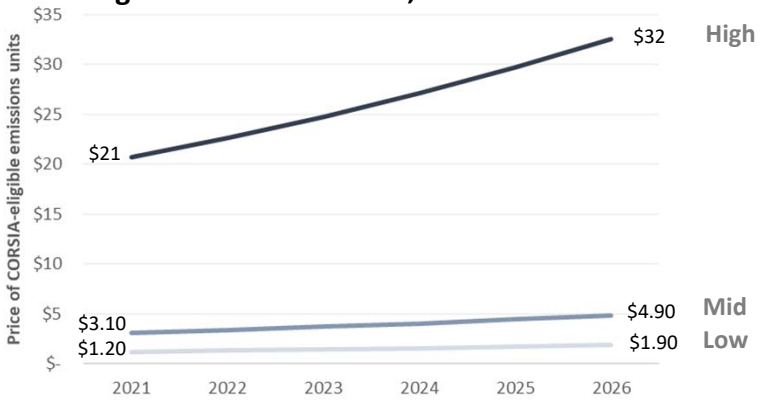
## 223rd session of Council

**CAEP/12 Scenario-based price of CORSIA-eligible emissions units*, 2021-2026**




## 225th session of Council

**CAEP/12 Scenario-based price of CORSIA-eligible emissions units*, 2021-2026**




**Total Cost** from Emissions Units

Cumulative cost from emissions units could range from **$0.8 to 2.3 billion** and **$0 to 0.8 billion** under an Average 2019-2020 baseline and 2019 baseline respectively (for mid-price scenario).

Cumulative cost from emissions units could range from **$0.1 to 1.8 billion** and **$0 to 0.4 billion** under an Average 2019-2020 baseline and 2019 baseline respectively (for mid-price scenario).

**For context and order of magnitude comparison, the global (domestic and international) aviation industry cumulative revenues from 2015-2020 was ≈ $3,700 billion.**

# Question 2:

## Estimation of Costs from Monitoring, Reporting and Verification (MRV)

CAEP's analysis of administrative costs for the implementation of CORSIA, for aeroplane operators and States, drawing upon the analysis undertaken by CAEP prior to adoption of Annex 16, Volume IV, and relevant information from States as a result of State letter consultation process;

# Background

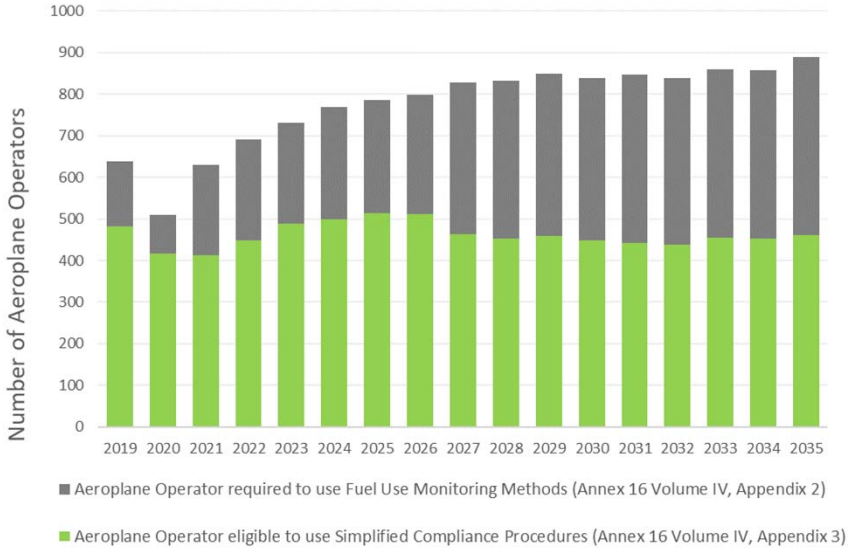
- **Leveraged analytical approaches used by CAEP prior to adoption of Annex 16, Volume IV.**

- **Modeling approach:**
  - **Mapped key functions and processes associated with the CORSIA to quantify and monetize the costs and emissions reductions.**
  - **Identified the scope of applicability of CORSIA i.e., the set of Aeroplane Operators that could be subject to MRV requirements,**
  - **Updated MRV cost model with relevant recent data to estimate MRV and Registry costs.**
  - **Assessed total expected cost of compliance with CORSIA between 2018 and 2035.**

# Background Statistics on Aeroplane Operators and States subject to Scope of Applicability of Annex 16 Volume IV

- Leveraged relevant data from CORSIA Integrated Model for purpose of comprehensive first order assessment of MRV costs.
- Analyses include approximately 510 to 890 Aeroplane Operators subject to the scope of applicability of Annex 16 Volume IV from 2019 and 2035.
- Substantial reduction in number of operators within scope of applicability of CORSIA due to Covid19 impacts.
- Over 140 States are expected to administer Aeroplane Operators subject to the requirements of Annex 16 Volume IV.

**Evolution of number of Aeroplane Operators subject to the scope of applicability of Annex 16 Volume IV from 2019 and 2035.**



# Assumptions for MRV and Registry Cost Model *

*for Aeroplane Operators and States*

- **CAEP leveraged and enhanced methodologies used by CAEP prior to adoption of Annex 16, Volume IV. Revalidated and updated relevant unit cost assumptions to reflect the experience of the implementation of CORSIA. State letter only provided data for 13 States.**

| | | | Aeroplane Operators Eligible to Use Simplified Procedures | | | | Aeroplane Operators (not eligible to use Simplified Compliance Procedures) | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Low | Mid | High | | Low | Mid | High | |
| NRC** | Aeroplane Operators | IT System Setup | $0 | $500 | $1,000 | | $5,000 | $252,000 | $500,000 | at implementation |
| Recurring Costs | Aeroplane Operators | Monitoring (fixed) | $1,000 | $1,500 | $1,650 | | $2,000 | $6,000 | $10,000 | per operator per year |
| Recurring Costs | Aeroplane Operators | Monitoring (variable) | $0 | $125 | $250 | | $0 | $250 | $500 | per aircraft per year |
| Recurring Costs | Aeroplane Operators | Verification*** | $2,500 | $7,600 | $12,500 | | $5,900 | $17,700 | $29,400 | per operator per year |
| Recurring Costs | Aeroplane Operators | Reporting | $1,055 | $2,205 | $3,355 | | $1,500 | $3,250 | $5,000 | per operator per year |
| Recurring Costs | Aeroplane Operators | Registry Costs | $550 | | | | | | | per operator per year |
| | | | | | | | | | | |
| Recurring Costs | States | Emissions Monitoring Plans (EMP) | $1,000 | $1,700 | $2,400 | | $2,000 | $2,600 | $3,200 | per operator per year |
| Recurring Costs | States | Emissions Reports (ER) Review and Checks | $1,500 (10%) | $2,300 (15%) | $3,100 (20%) | | $2,500 (10%) | $3,750 (15%) | $5,000 (20%) | per operator per year for initial submission with likelihood of resubmission for (x%) of operators |
| Recurring Costs | States | Helpdesk Function | $1,625 | $2,600 | $3,575 | | $2,925 | $4,128 | $5,330 | per operator per year |
| | | | | | | | Low | Mid | High | |
| Recurring Costs | States | Registry handling | | | | | 10% | 10% | 10% | (of total cost to State) per year |
| Recurring Costs | States | Reporting | | | | | $2,000 | $6,000 | $10,000 | per year |
| NRC** | States | IT System Setup | | | | | $5,000 | $10,000 | $20,000 | per operator at implementation (2019-2020) |

** First order estimates, subject to change as recommendations on design and implementation of CORSIA and CCR are finalized.*

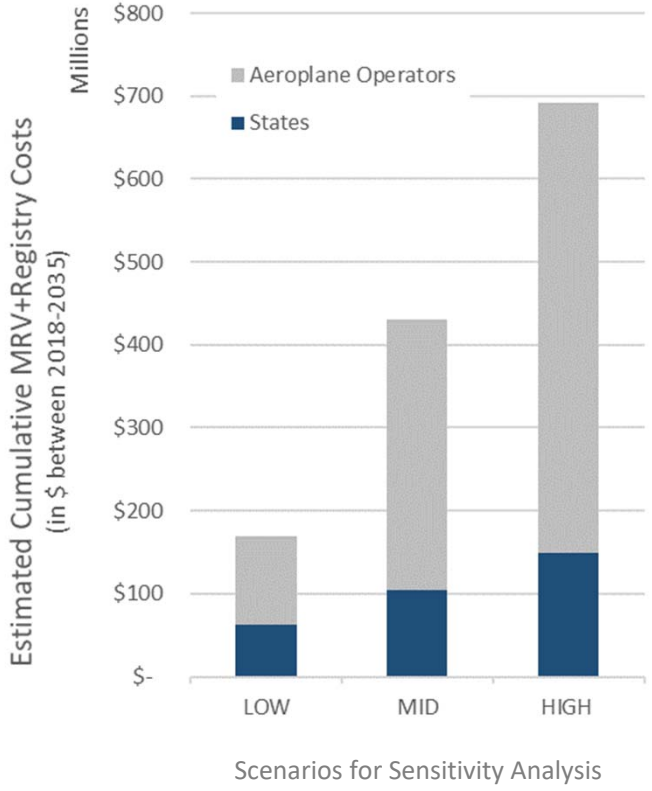
*** NRC: Non-Recurring Cost.*

**** Range of estimates for aeroplane operators not eligible to use simplified compliance procedures based on experience and input from airlines. Estimates for eligible operators based on this range and scaled down based on assumptions and recommendations from GMTF (i.e., GMTF/13-WP/13).*

# Estimated MRV and Registry Costs for ICAO, States and Aeroplane Operators

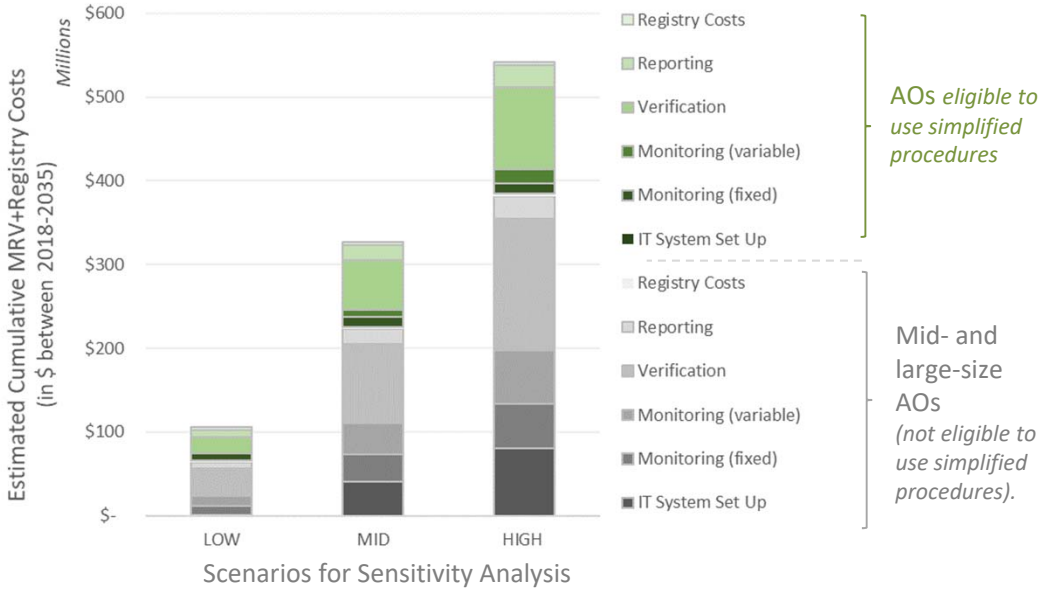
- **Total MRV and Registry Costs for all Aeroplane Operators and States could be approximately $430 million USD from 2018-2035 (with a range from $170 to $700 million).**

- **Aeroplane operators bear most (63% to 78%) of the total MRV costs.**



# Distribution of CORSIA administrative cost
(MRV, Registry, excluding Emissions Units)

- **Mid- and large-size Aeroplane Operators (not eligible to use simplified procedures) account for approximately 70% of total MRV and Registry Costs. AOs eligible to use simplified procedures account for the remaining 30%.**
- **Verification, Monitoring followed by Reporting are dominant costs for mid- and large-size AOs.**
- **Verification is the dominant cost for AOs eligible to use simplified procedures.**



# Question 3:

## Summary of Costs to States and Operators

**Assessment of CORSIA's […] cost impact on States and aeroplane operators and on international aviation […];**

# Summary of Costs to States and Operators

## *Total costs to operators:*

- *Costs to operators are largely driven by offsetting requirements and to lesser extent by the implementation of MRV provisions.*
- *Total cumulative costs from offsetting requirements through 2026 could range from $0.1 to 1.8 billion and $0 to 0.4 billion under an Average 2019-2020 baseline and 2019 baseline respectively.*
- *Total MRV related costs could reach $325 million through 2035 (with a range from $110 to $540 million).*

## *Total costs to States:*

- *Costs to States are solely driven by the implementation of MRV provisions from CORSIA.*
- *Total MRV related costs could be approximately $105 million through 2035 (with a range from $65 to $150 million).*

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THANK YOU