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European Union Aviation Safety Agency

Risks Related to Out of Specification Aviation Fuels During Sustainable Aviation Fuel Market Adoption

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Disclaimer

This SIA in no way implies that SATF is not safe as a technology. The increased risk stems from aircraft using out-of-spec SATF due to out-of-spec SBC and mis-blending of the SBC with the conventional jet fuel. SATF is safe when it is on-spec.

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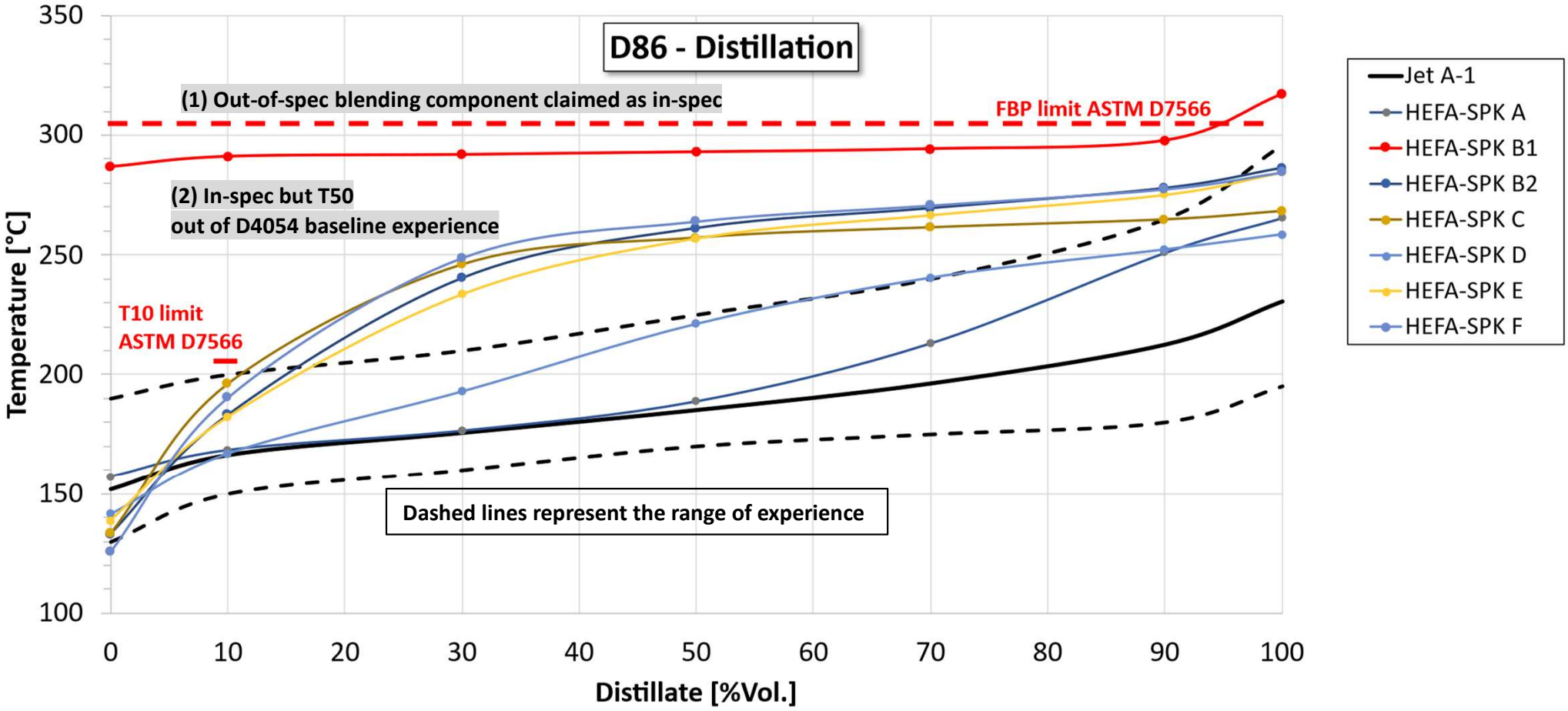
Context

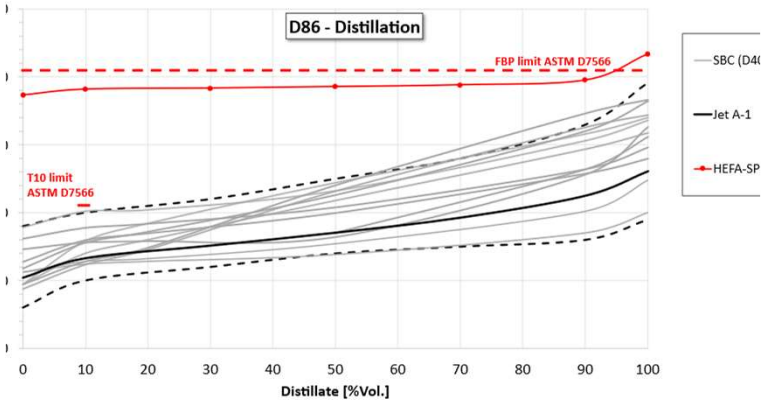
- Transitioning to the major use of SATF, triggered by sustainability.
- ReFuelEU Aviation mandate in Europe for SAF/SBC
- Sustainable Aviation Fuel (SAF) = Synthetic Blend Component (SBC). **SAF is not a fuel**.
- SBC + fossil jet fuel = Sustainable/Synthetic Aviation Turbine Fuel **(SATF) goes inside the aircraft**.
- **SATF is safe** as a technology.
- **System is safe** if the existing standards are applied.
- Must ensure operational safety and prepare actors for the challenges.

CSR – HEFA with unusual/out-of-spec distillation



Summary of the challenge

Out-of-spec SBC



Out-of-specification blending components will be detected with a very high probability.

Is the system robust (enough) against fraud?
What if fraudulent actors optimize towards blend requirement and consciously neglect process, manufacturer and blending component requirements?

CSR: Confidential Safety Reporting

Complex global fuel supply chains

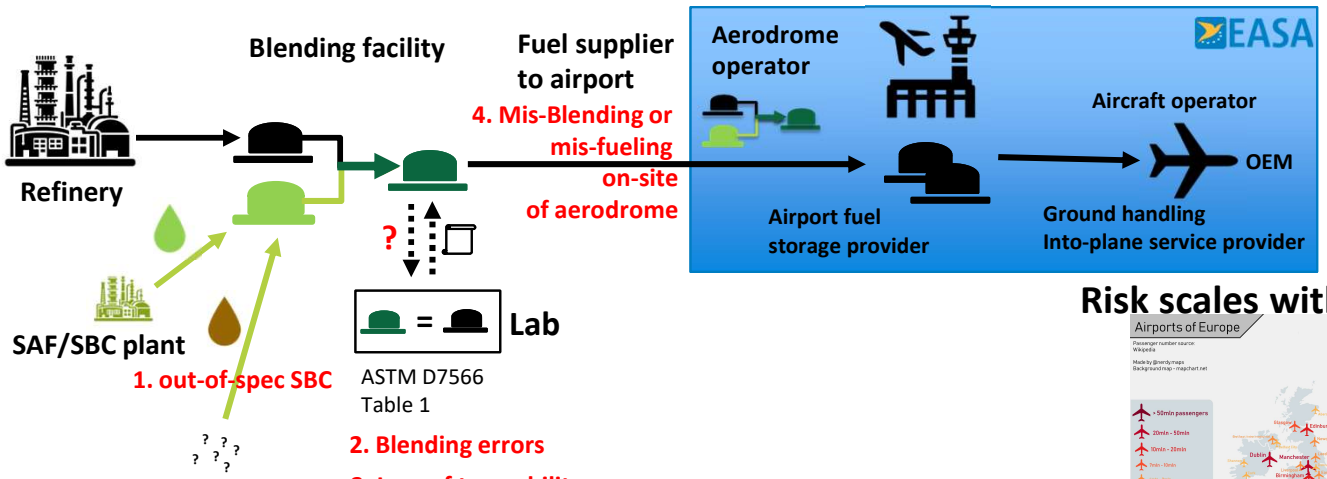
Comprehensive industry standards and audits (JIG 1, JIG2, EI/JIG 1530, EI 1533)

Industry standards are voluntary and questioned by new market entrants

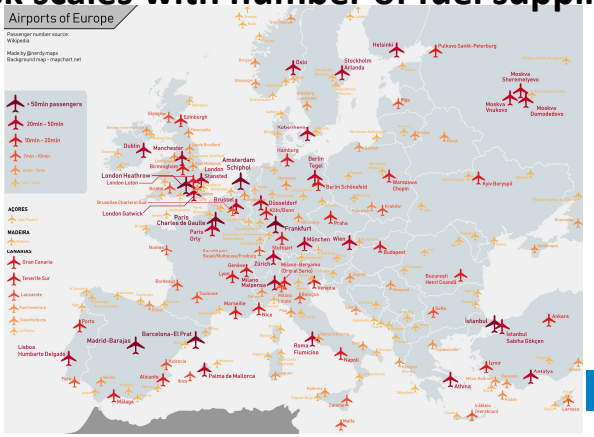
Industry standard organizations in fuel supply chain:
JIG Joint Inspection Group
EI Energy Institute

Increase Risk during SAF Market Uptake

EASA regulatory approach:
ensure the provision/use of
uncontaminated fuel with the correct specifications



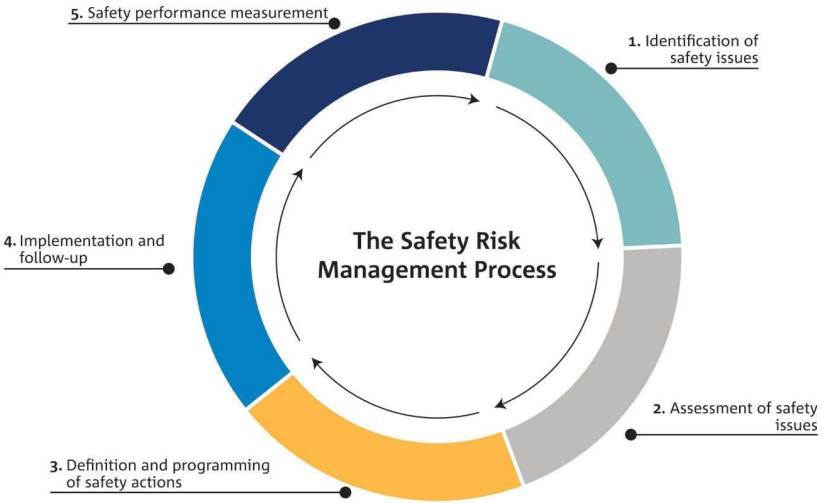
Risk scales with number of fuel supplier



See SIB 2025-01 & EPAS Vol III SI-0060

EASA's Safety Risk Management process

- The European Safety Risk Management (SRM) process has five steps:
  1. **Identification** of safety issues: safety issue was first suggested by airlines, followed by the Confidential Safety Report (CSR).
  2. **Assessment** of safety issues: a technical safety issue assessment (SIA) is performed to assess where the weaknesses in the system are and to propose long-term mitigation actions. Information from occurrence data and expert judgement is used. *We are performing this step now*.
  3. **Impact assessment** (IA) assesses the impacts (including **financial costs**) of the mitigation actions and identify the most suitable European Plan for Aviation Safety (EPAS) actions (rulemaking, safety promotion, research,…).
  4. **Implementation and follow-up**: EPAS actions are implemented.
  5. **Safety performance measurement** (i) are these EPAS actions improving safety (ii) are there any new safety issues in the system in the short, medium or long term that might require our attention?
- Two key documents:
  1. European Plan for Aviation Safety (EPAS): actions EASA takes to solve the most important safety challenges in the European aviation system.
  2. Annual Safety Review (ASR): provides an overview of aviation safety in Europe and compares the results with the previous 10 years.



Description

- Two problems identified:
  - Higher price of SATF, need to comply with ReFuelEU and low availability of SBC may attract fraudulent activities.
  - Accidental mis-blending: new market entrants that are inexperienced fuel suppliers and lack of expertise in quality assurance and process knowledge.
- Consequences of out-of-spec SATF (most important ones):
  - Fuel degradation in fuel storage tanks
  - Erroneous fuel quantity indications
  - Filter clogging
  - Engine system failure (extreme cases)
  - Aircraft upset eventually

The Safety Issue (SI)

- SI-0060: Out-of-spec Sustainable Aviation Turbine Fuels (SATF) in operations
- This Safety Issue (SI) will study two major threats/sub-issues:
  - Out-of-spec SBC
  - Mis-blending of the SBC with the conventional jet fuel, wherever this mis-blending happens (on and off-airport).
- This SI only deals with drop-in SATF, non-drop-in fuels like Hydrogen are excluded.
- This SIA in no way implies that SATF is not safe as a technology. The increased risk stems from aircraft using out-of-spec SATF due to out-of-spec SBC and mis-blending of the SBC with the conventional jet fuel. **SATF is safe as a technology**.

Keep in mind that…

- EASA knows ***SATF is safe as a technology,*** threat is only from off-spec SBC and/or misblending.
- The ***system is safe*** when the existing standards are applied.
- SIA is ongoing, too early to talk about conclusions.
- EASA will ***share the lessons learned when the SIA is finished***.
- In the next few slides we will share some of our ***lessons learned so far***.
- If you have anything to share, please come talk to us!

Lesson 1: potential out-of-spec fuel impacts

I. Immediate impacts
- → Increased water content
  → fuel inlet restrictions
  → reduced thrust/ loss of power
- → …

II. Long-term impact
- → Increased levels of metals
  → Reduced thermal stability
  → long-term impact on maintenance
- → …

III. No impact
- → Slightly off-spec T10 or T90
- → ….

None of the above fuels should go into the aircraft.

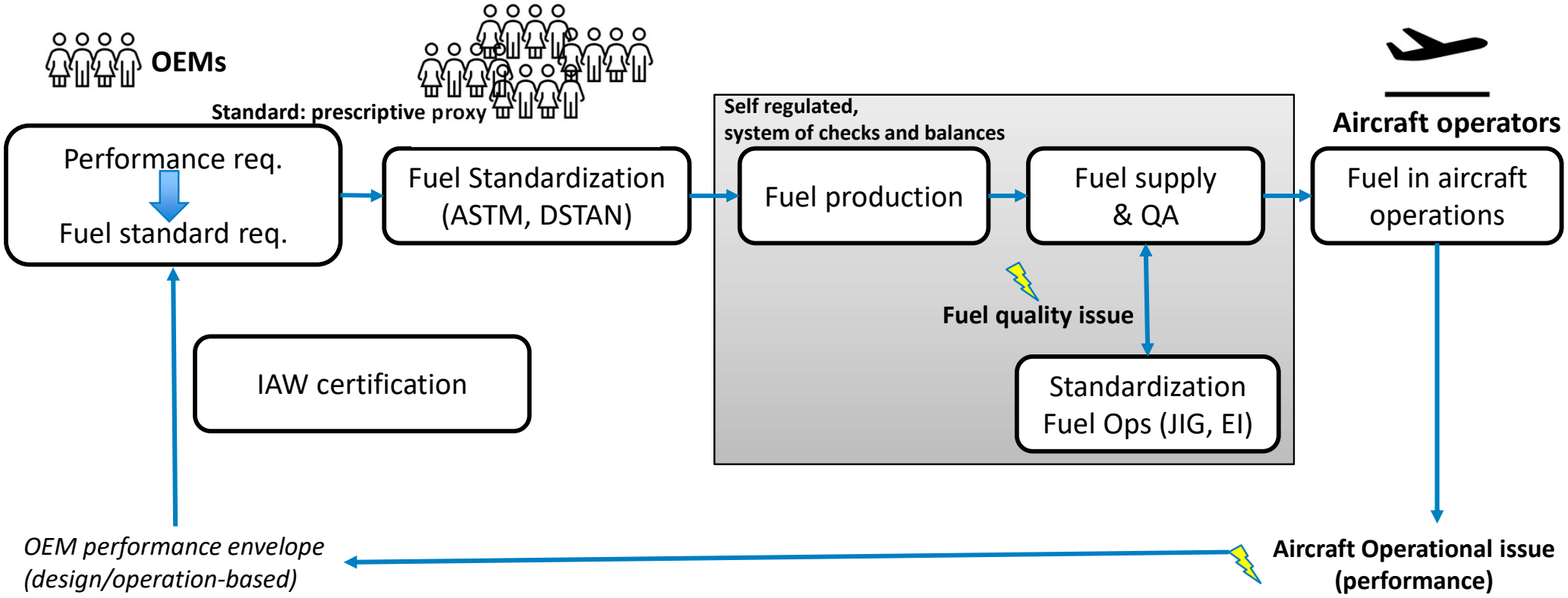
Potential cause:
Mis-blending or mis-fueling on site the airport

Off spec fuel & not fit-for-purpose

Potential cause:
Off-spec fuels which is diluted in the supply chain

Off spec fuel & fit-for-purpose

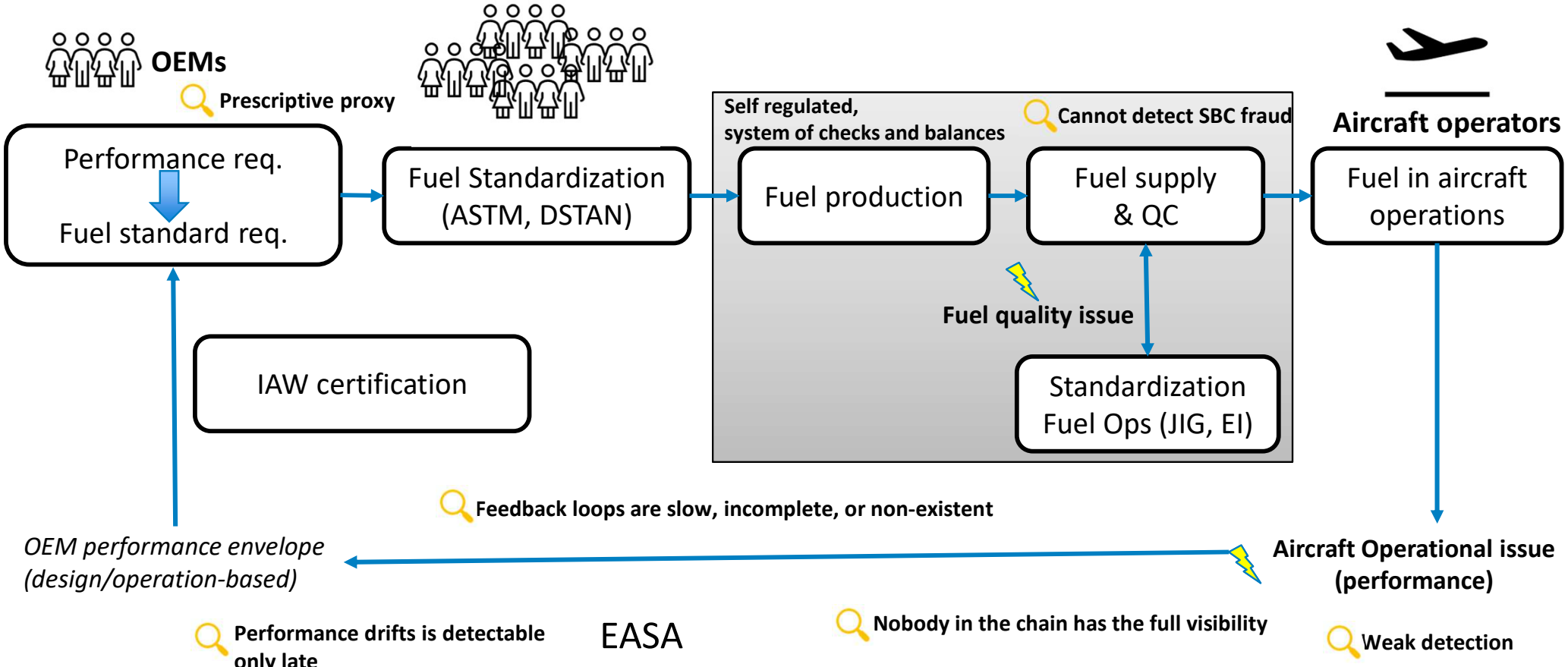
Lesson 2: Aviation Fuel Safety System



EASA
risk-based oversight

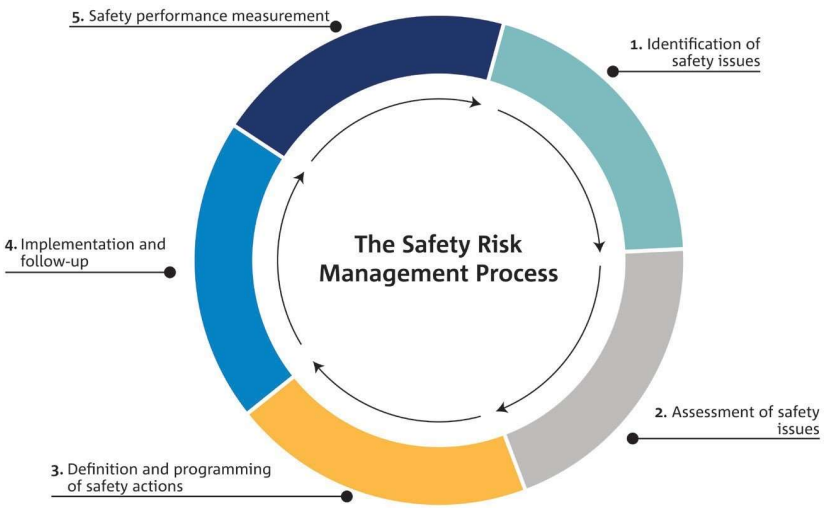
Lesson 2: Aviation Fuel Safety System

Focus areas — Factors to consider in this transition to the major use of SATF.



Summary

- **SATF is safe** as a technology.
- **System is safe** if the existing standards are applied.
- System changes introduced with the transition to major use of SATF.
- EASA studying the threats of out-of-spec SBC and misblending in greater detail through the SIA.
- Lessons learned will be shared with the different stakeholders.
- What you can do:
  - ✓ Read the Safety Information Bulletin (SIB)
  - ✓ Apply the EI and JIG standards in your operations
  - ✓ Raise awareness of the SIB



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Any questions?

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