European Union Aviation Safety Agency

Notice of Proposed Amendment 2022-10

in accordance with Article 6(1) of MB Decision No 01-2022

Improvement in the survivability of rotorcraft occupants in the event of a crash

Phase 1 – Crash resistant fuel systems

RMT.0710

EXECUTIVE SUMMARY

The objective of this Notice of Proposed Amendment (NPA) is to mitigate the risks linked to a post-crash fire involving a rotorcraft.

This NPA proposes to mandate the installation of a crash-resistant fuel system (CRFS) onto existing rotorcraft designs that are still in production and the retrofit of existing rotorcraft that are operated in the EASA Member States.

Several accident investigation boards put forward safety recommendations (SRs) on the lack of CRFSs for rotorcraft that had been certified before the significant improvements of the rules for fuel system crash resistance were introduced in the 1990s.

The proposed amendments are expected to increase safety and improve the survivability of rotorcraft occupants by significantly reducing the likelihood of a post-crash fire.

Action area:	Design and production
Affected rules:	— Regulation (EU) 2015/640 (the 'Additional Airworthiness Specifications Regulation'); — Certification Specification for Additional Airworthiness Specifications for Operations (CS-26)
Affected stakeholders:	Helicopter operators, design organisation approval (DOA) and production organisation approval (POA) holders
Driver:	Safety
Rulemaking group:	No
Impact assessment:	Yes

EASA rulemaking procedure milestones

Start Terms of Reference	**Public consultation** NPA 2022-10	**Proposal to the Commission** EASA Opinion	Adoption by the Commission Implementing act	**Decision** Certification Specifications, Acceptable Means of Compliance, Guidance Material
16.12.2021	11.11.2022	2023	2024	2024

Table of contents

1. About this NPA

1.1. How this NPA was developed

The European Union Aviation Safety Agency (EASA) developed this Notice of Proposed Amendment (NPA) in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2]. This Rulemaking Task (RMT).0710 is included in Volume II of the European Plan for Aviation Safety (EPAS) for 2022-2026. The scope and timescales of the task were defined in the related Terms of Reference (ToR)[3].

The NPA is hereby submitted to all interested parties for consultation in accordance with Article 115 of the Basic Regulation, and Article 6(1) of the Rulemaking Procedure.

The major milestones of this RMT are presented on the cover page.

1.2. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at **http://hub.easa.europa.eu/crt/**[4].

The deadline for the submission of comments is **13 February 2023**.

1.3. The next steps

Following the public consultation, EASA will review all the comments received. Considering the comments received, EASA will revise, if necessary, the proposed amendments to Regulation (EC) 2015/640[5] (the 'Additional Airworthiness Specifications Regulation') and issue an opinion.

The opinion will be submitted to the European Commission, which will decide whether to amend the 'Additional Airworthiness Specifications' Regulation based on the opinion.

If the European Commission decides to amend said Regulation based on the opinion, EASA will publish a decision to amend the related certification specifications (CSs) and guidance material (GM) to address the amendments to the Regulation.

[1] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

[2] EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 01-2022 of 2 May 2022 on the procedure to be applied by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure'), and repealing Management Board Decision No 18-2015 (https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-01-2022-rulemaking-procedure-repealing-mb).

[3] https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0710

[4] In case of technical problems, please send an email to crt@easa.europa.eu with a short description.

[5] Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2015.106.01.0018.01.ENG).

The individual comments received on this NPA and the EASA responses to them will be reflected in a comment-response document (CRD), which will be published on the EASA website[6].

6 https://www.easa.europa.eu/document-library/comment-response-documents

2. In summary — why and what

2.1. Why we need to amend the rules — issue/rationale

In 1994, the Federal Aviation Administration (FAA) and the Joint Aviation Authorities (JAA) introduced certification requirements for crash-resistant fuel systems (CRFSs) for all newly certified rotorcraft. In 2003, EASA incorporated those occupant protection certification requirements into the Certification Specifications for Small Rotorcraft (CS-27) and the Certification Specifications for Large Rotorcraft (CS-29) for all newly certified rotorcraft. Consequently, rotorcraft that had been designed and certified before 1994 (prior to the establishment of EASA) were not required to meet the improved occupant protection requirements. This resulted in a mixed fleet of rotorcraft with some rotorcraft being compliant with the CRFS requirements and some not, depending on the certification year. The rotorcraft that are not compliant with the CRFS requirementshave had an adverse effect on the overall safety of the European rotorcraft fleet due to the higher likelihood of a post-crash fire with associated fatalities. Moreover, derivative rotorcraft models that were certified after 1994 have not been required to comply with the latest CRFS requirements due to the 'changed product rule' (as described in point 21.A.101 of Annex I (Part 21) to Regulation (EU) No 748/2012[7] (the 'Initial Airworthiness (IAW) Regulation')) and the grandfather rights that are acquired after the initial type certificate (TC) for a design is issued. Currently, 60 % of the rotorcraft fleet in service in Europe are compliant with the requirements for occupant protection, mainly with regard to CRFSs.

Since 2011, nine safety recommendations (SRs) have been addressed to EASA on the need to improve the incorporation of CRFSs into newly manufactured rotorcraft and/or as a retroactive modification that can be installed onto the existing rotorcraft fleet.

In 2018, the FAA initiated the Aviation Rulemaking Advisory Committee (ARAC) Rotorcraft Occupant Protection Working Group (ROPWG) (with the participation of EASA) and published a set of recommendations for the application of design improvements for occupant protection including CRFSs.

Due to a decision by the US Senate and a law change as of April 2020, newly manufactured rotorcraft that are operated or registered in the United States (US) must be fully or partially compliant with the CFRS requirements.

Related safety issues

The following SRs, which are addressed to EASA from aircraft accident investigation report(s) that are published by the designated safety investigation authorities[8], are considered for this RMT (for each of the SRs, the following information is provided: SR number, summary of the SR/SR text, accident/incident aircraft type and registration, date and location of the accident/incident):

— Accident Robinson R44 VH-HWQ, 21 March 2013, Australia, (ASTL-2015-029) ATSB AO-2013-055-SR-029: 'The ATSB recommends that the European Aviation Safety Agency take

[7] Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (recast) (OJ L 224, 21.8.2012, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0748&qid=1664461533574).

[8] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (OJ L 295, 12.11.2010, p. 35) (http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1479716039678&uri=CELEX:32010R0996).

action to increase the number of existing rotorcraft that are fitted with a crash-resistant fuel system or have an equivalent level of safety in respect of post-impact fire.'

— (ASTL-2015-030) ATSB AO-2013-055-SR-030: 'The ATSB recommends that the European Aviation Safety Agency take action to increase the number of helicopters manufactured in accordance with the 1994 certification requirements for helicopters to include a crash-resistant fuel system.'

— Accidents EC130B4 (N356AM), 6 March 2015, St. Louis, Missouri, and AS350B3e (N390LG) 3 July 2015, Frisco, Colorado, (UNST-2016-001) NTSB (two survivable accidents with serious injuries because of post-crash fires resulting from an impact-related breach in the fuel tank): 'Once Airbus Helicopters completes development of a retrofit kit to incorporate a crash-resistant fuel system into AS350 B3e and similarly designed variants, prioritize its approval to accelerate its availability to operators (A-16-11).'

— On 15 January 2014, the NTSB released the following recommendation (A-14-001): 'Require owners and operators of existing R44 helicopters to comply with the fuel tank retrofit advised in Robinson Helicopter Company Service Bulletin SB-78B to improve the helicopters' resistance to a post-accident fuel tank leak (A-14-001).'

— Loss of control, Robinson Helicopter Company R44 Astro, VH-HFH, on 4 February 2011, report AO-2011-06: No specific safety recommendation was published by the Australian Transport Safety Bureau (ATSB), but the bladder-type fuel tank retrofit was mentioned. Following the VH-HFH accident, on 9 March 2012, the ATSB issued safety advisory notice AO-2012-021-SAN-001 on R44 helicopter all-aluminium fuel tanks.

— Loss of control involving Robinson R44 helicopter, VH-COK, on 4 February 2012, report AO-2012-021, issued on 3 May 2013. The ATSB published recommendation AO-2012-021-SI-01 'Fitment of rubber, bladder-type fuel tanks to R44 helicopters'.

— Collision with terrain involving Robinson R44 helicopter, VH-HWQ. on 21 March 2013. On 5 April 2013, the ATSB published safety recommendation AO-2013-055-SR-001 towards the Civil Aviation Safety Authority (CASA): 'The ATSB recommends that CASA take further action to ensure that owners and operators of Robinson R44 helicopters are aware of the relevant regulatory requirements and comply with the manufacturer's service bulletin SB-78B to replace all-aluminium fuel tanks with bladder-type tanks on Robinson R44 helicopters.'

— Following an accident involving an AS350 Airbus helicopter (CS-HFT) in Portugal on 5 September 2019, the Portuguese Accident Investigation Authority made the following recommendation to EASA (PORT-2020-001): 'It is recommended that EASA follow its Rotorcraft Safety Roadmap publication principles, producing rulemaking documentation requiring retroactive application of the current improvements in fuel tank crash resistance for rotorcraft certified before the new certification specification for type design entered into force. Helicopters used for Commercial Operations shall be subject to this additional airworthiness requirement for operations.'

— On Saturday, 31 August 2019, an AS350 B3 Airbus helicopter, registered LN-OFU, crashed in the Skoddevarre mountains near Alta (Norway). The Norwegian Safety Investigation Authority (NSIA) recommends (SR No 2022/01T) that EASA requires that all helicopters, new and used, that are delivered in or imported to Europe be equipped with CRFSs in accordance with

CS 27.952 or CS 29.952, regardless of their type certification date. In addition, the NSIA recommends EASA to not permit commercial passenger flights with helicopters that are not equipped with CRFSs in accordance with CS 27.952 or CS 29.952, regardless of their type certification date.

In addition, in 2014, EASA internally issued a report titled 'Robinson R44 Post Impact Fire Unsafe Condition Evaluation'. Based on that report, EASA concluded that a potential unsafe condition existed considering:

— the abnormal post-crash fire rate taking into account rotorcraft generational evolution;

— the abnormal R44 post-crash fire rate compared to other rotorcraft;

— the potential technical susceptibility to risk of a leak/ignition source of the R44 compared to the R22; and

— the events causing fatalities.

EASA issued Airworthiness Directive (AD) No 2014-070[9] to address this unsafe condition, which in turn addressed some of the SRs above. The remaining SRs will be addressed by the proposed amendments to the Annex (Part-26) to the Additional Airworthiness Specifications Regulation (see Chapter 3) by mandating:

— the installation of a CRFS onto newly produced rotorcraft; and

— the retrofit of the existing EU rotorcraft fleet

by specific compliance dates.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This proposal will contribute to achieving the overall objectives by addressing the issues described in Section 2.1.

The specific objective of this NPA is to mitigate the risks linked to a post-crash fire involving a rotorcraft, thus improving rotorcraft occupant survivability in the event of a crash. This can be achieved by increasing the number of rotorcraft that operate in the European Union with a CRFS installed, thereby reducing the likelihood of a post-crash fire.

2.3. How we want to achieve it — overview of the proposed amendments

Based on the Impact Assessment (IA) of the options that are identified in Section 4.3 on how the specific objective of this NPA can be achieved, this NPA proposes amendments to the Additional Airworthiness Specifications Regulation and to the Certification Specification for Additional Airworthiness Specifications for Operations (CS-26), to mitigate the risk of a post-crash fire due to a fuel leak. The proposed amendments to Part-26 have the following different applicability criteria and dates:

— from 1 year after the entry into force of the amendments to Part-26, all newly produced rotorcraft (small (CS-27) and large (CS-29) rotorcraft) will be required to comply either with the full crash resistance requirements for fuel systems that are contained in CS 27/29.952,

[9] https://ad.easa.europa.eu/ad/2014-0070

CS 27/29.963, CS 27/29.973, and CS 27.975(b) or CS 29.975 (a) or with the CS-26 requirements that have been assessed to provide an acceptable reduction in the likelihood of a post-crash fire;

— from 7 years after the entry into force of the amendments to Part-26, all rotorcraft (CS-27 and CS-29 rotorcraft) that are operated in EASA Member States (MSs) and are designed for five or more occupants will be required to comply either with the full crash resistance requirements for fuel systems that are contained in CS 27/29.952, CS 27/29.963, CS 27/29.973, and CS 27.975(b) or CS 29.975 (a) or with the CS-26 requirements that have been assessed to provide an acceptable reduction in the likelihood of a post-crash fire; and

— from 15 years after the entry into force of the amendments to Part-26, all rotorcraft (CS-27 and CS-29 rotorcraft) that are operated in EASA MSs and are designed for four or less occupants will be required to comply either with the full crash resistance requirements for fuel systems that are contained in CS 27/29.952, CS 27/29.963, CS 27/29.973, and CS 27.975(b) or CS 29.975(a) or with the CS-26 requirements that have been assessed to provide an acceptable reduction in the likelihood of a post-crash fire.

This stepped approach to the applicability of the amendments to Part-26 will provide for an incremental improvement in the safety of the EU rotorcraft fleet, whilst also providing operators and owners with the time and opportunities needed, to take decisions about the composition of their fleets and implement the necessary design changes to ensure compliance. Over time, thanks to the proposed amendments, the portion of the EU rotorcraft fleet that is not compliant with the CRFS requirements will decrease, thereby reducing the overall risk of an otherwise survivable accident resulting in a post-crash fire.

Following an analysis of accident data, the ARAC ROPWG concluded[10] that a small CS-27 rotorcraft design that is partially compliant with the CRFS requirements would be far superior in preventing a post-crash fire than the design of a non-compliant rotorcraft, and would be nearly or equally effective as the design of a rotorcraft that is fully compliant with the CRFS requirements.

That conclusion was based on the fact that partially compliant CRFS models that passed a 50-foot drop test (with or without structure) and had a puncture resistance of at least 250 lb had the following characteristics:

— compared to fully compliant CRFS rotorcraft, they were equally effective at preventing post-crash fires and thermal injuries; and

— compared to non-compliant CRFS rotorcraft, they reduced the post-crash fire rate due to fuel spillage in survivable accidents by 90–100 %.

The ARAC ROPWG, and subsequently EASA, considered that partial compliance with the CRFS requirements would be as effective but less costly and far less disruptive to the industry as full compliance since:

— it would allow original equipment manufacturers (OEMs) to avoid the costs of developing, certifying, and implementing heavy structural modifications to fuel tanks, as it was established

[10] https://www.faa.gov/regulations_policies/rulemaking/committees/documents/media/ROPWG%20Task%206%20Final%20Report%20 Revised%202018-09-27.pdf

that the lack of structural modifications to fuel tanks in partially compliant fuel systems did not increase post-crash fire rates compared to fully compliant systems; and

— it would allow OEMs to avoid the cost of repeating fuel tank drop tests if they had already performed such drop tests with the fuel tank 'out of structure'.

For those reasons, EASA included the possibility to consider demonstrating partial compliance with the CRFS requirements as meeting the Part-26 requirement for the 'likelihood of a post-crash fire to be minimised as far as practicable in the design of the fuel system'. This partial compliance requirement is detailed in the proposed new CS 26.440.

New helicopter type designs that were certified for the first time (i.e. not a derivative) after 1994 should already be fully compliant with the CS-27 and CS-29 requirements that are referenced in CS 26.440, and no further action should be necessary for those types.

2.4. What are the expected benefits and drawbacks of the proposed amendments

The expected benefits and drawbacks of the proposed amendments are summarised below. For the full IA, please refer to Chapter 4.

The expected benefits of the proposed amendments are the following:

— a significant reduction in the likelihood of a post-crash fire in Europe in the event of a survivable rotorcraft accident;

— a reduction in the number of fatalities in Europe due to thermal injuries caused by a post-crash fire;

— harmonisation of the safety levels of newly produced rotorcraft between the EASA MSs and the US; and

— reduced risk and exposure to potential litigation against operators in the event of a post-crash fire in an otherwise survivable rotorcraft accident.

The expected drawbacks of the proposed amendments are the following:

— additional costs of developing and installing the necessary design changes for the retrofit of the existing EU rotorcraft types that are currently not compliant with the CRFS requirements;

— additional operating costs due to the additional weight of a fuel system that is compliant with the CRFS requirements (when compared with the non-compliant rotorcraft design[11]), including a reduction in range, a reduction in payload or an increase in fuel consumption; and

— for a limited number of rotorcraft types, there could be a need for operators to replace a non-compliant rotorcraft if the OEM does not offer design changes to make the rotorcraft type compliant with the CRFS requirements.

[11] In this comparison, an equivalent compliant rotorcraft design (when initially certified after 1994) is not compared with a rotorcraft design that is required to be compliant through an amendment to Part 26.

3. Proposed amendments

The amendment is arranged to show deleted, new or amended, and unchanged text as follows:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in blue;

— an ellipsis '[…]' indicates that the rest of the text is unchanged.

Where necessary, the rationale is provided in *blue italics*.

3.1. Draft regulation (draft EASA opinion)

26.440 Fuel system crash resistance

(a) Operators of small helicopters and large helicopters that have their first individual certificate of airworthiness issued on or after *[1 year after the date of entry into force]* shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

(b) Operators of small helicopters and large helicopters that are designed for five or more occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

(c) Operators of small helicopters and large helicopters that are designed for four or less occupants shall ensure that the likelihood of a post-crash fire is minimised as far as practicable in the design of the fuel system.

Note: point (b) will become applicable 7 years after the date of entry into force of the regulation and point (c) will become applicable 15 years after the date of entry into force of the regulation.

3.2. Draft certification specifications (draft EASA decision)

CS 26.440 Fuel system crash resistance

Compliance with point 26.440 of Part-26 is demonstrated by complying with CS 27.952 of CS-27 or the equivalent, CS 29.952 of CS-29 or the equivalent, and with CS 27.963 of CS-27 or the equivalent, CS 29.963 of CS-29 or the equivalent, and with CS 27.973 of CS-27 or the equivalent, CS 29.973 of CS-29 or the equivalent, and with CS 27.975(b) of CS-27 or the equivalent, CS 29.975(a) of CS-29, or with the following:

(a) Each fuel tank, or the most critical fuel tank, must be subjected to a drop test that results in no subsequent leakage of the fluid that is contained within it, using the following parameters:

(1) the tank must be dropped from a height of at least 15.2 m (50 ft);

(2) the surface that the tank will impact after it has been dropped must not be capable of absorbing the energy of the impact (i.e. the surface must not deform as a result of the impact);

(3) the tank must be filled with water to a level that is 80 % of the normal, full capacity of the tank; and

(4) the tank must drop freely and impact in a horizontal position of ±10 °.

(b) Self-sealing breakaway fuel line couplings must be installed unless hazardous relative motion of fuel system components to each other or to local rotorcraft structure is demonstrated to be extremely improbable or unless other means are provided. The couplings or equivalent devices must be installed at all fuel tank-to-fuel line connections, tank-to-tank interconnects, and at other points in the fuel system where local structural deformation could lead to release of fuel.

(1) The design and construction of self-sealing breakaway fuel line couplings must incorporate the following design features:

(i) The load necessary to separate a breakaway coupling must be between 25 % and 50 % of the minimum ultimate failure load (ultimate strength) of the weakest component in the fluid-carrying line. The separation load must in no case be less than 1334 N (300 lb), regardless of the size of the fluid line.

(ii) A breakaway coupling must separate whenever its ultimate load (as defined in subparagraph (b)(1)(i)) is applied in the failure modes that are most likely to occur.

(iii) All breakaway couplings must incorporate design provisions to visually ascertain that the coupling is locked together (leakage-free) and is open during normal installation and service.

(iv) All breakaway couplings must incorporate design provisions to prevent uncoupling or unintended closing due to operational shocks, vibrations, or accelerations.

(v) No breakaway coupling design may allow the release of fuel once the coupling has performed its intended function.

(2) All individual breakaway couplings, coupling fuel feed systems, or equivalent means must be designed, tested, installed, and maintained so that inadvertent fuel shut-off in flight is improbable in accordance with CS 27.955(a) or CS 29.955 or the equivalent, and must comply with the fatigue evaluation requirements of CS 27.571 or CS 29.571, as appropriate, or the equivalent, without leakage.

(3) Alternate means equivalent to the use of breakaway couplings must not create a survivable impact-induced load on the fuel line to which they are installed, which is greater than 25 % to 50 % of the ultimate load (strength) of the weakest component of the line, and must comply with the fatigue evaluation requirements of CS 27.571 or CS 29.571, as appropriate, or the equivalent, without leakage.

(c) Fuel tanks, fuel lines, electrical wires, and electrical devices must be designed, constructed, and installed, as far as practicable, to be crash-resistant.

(d) Rigid or semi-rigid fuel tank or bladder walls must be impact- and tear-resistant.

(e) Each flexible fuel tank bladder or liner must be approved or shown to be suitable for the specific application and must be puncture-resistant. Puncture resistance must be shown by using the methodology that is contained in paragraph 16.0 of European Technical Standard Order (ETSO)-C80, when resisting a minimum puncture force of:

(1) 1646 N (370 lbs); or

(2) 1112 N (250 lbs) if the drop test that is required in paragraph (a) is successfully conducted with the tank enclosed in a surrounding structure that is representative of the tank installation that includes any projections or other design features that are likely to contribute to the rupture of the tank.

(f) The venting system must be designed to minimise spillage of fuel through the vents to an ignition source in the event of either a rollover during landing, ground operation, or a survivable impact.

3.3 Draft guidance material (draft EASA decision)

GM 26.440(b)(3) Fuel line slack or stretch

Where practicable, installations that use a fuel line slack or stretch as an equivalent means should be able to elongate enough to accommodate any probable relative motion between the ends of the line during an accident. 20–30 % of the line length may be used as a guideline in lieu of a more rational analysis.

GM 26.440(d) Impact and tear resistance applicability

CS 26.440(d) only applies to rigid or semi-rigid fuel tank or bladder walls, hence, flexible liners are not required to comply with that requirement.

4. Impact assessment (IA)

4.1. What is the issue

The results of accident investigations have provided evidence that rotorcraft that do not comply with the latest occupant protection requirements are more likely, in an otherwise survivable crash, to result in a fatal accident (multiple loss of lives) due to a post-crash fire. Indeed, SRs have been addressed to EASA to require the incorporation of CRFSs into newly manufactured rotorcraft and/or to retrofit the existing rotorcraft fleet. A list of relevant SRs that are addressed to EASA can be found in Section 2.1 under 'Realted Safety Issue'.

The SRs show that rotorcraft models that are not required to comply with the latest occupant protection requirements provide a low level of occupant protection. Table 1 and Figures 1 and 2 present an overview of the EU rotorcraft fleets that are compliant with the CRFS requirements in total and by type of rotorcraft.

TABLE 1 – EU FLEET WITH CRFS[12]

Rotorcraft category	EU rotorcraft fleet (2020)	Share of EU rotorcraft fleet that have incorporated a CRFS into their design (actual configuration)
Small rotorcraft (CS-27/CFR[13] §27)	4 847	65 %
Large rotorcraft (CS-29/CFR §29)	963	37 %
Total	5 810[14]	60 %

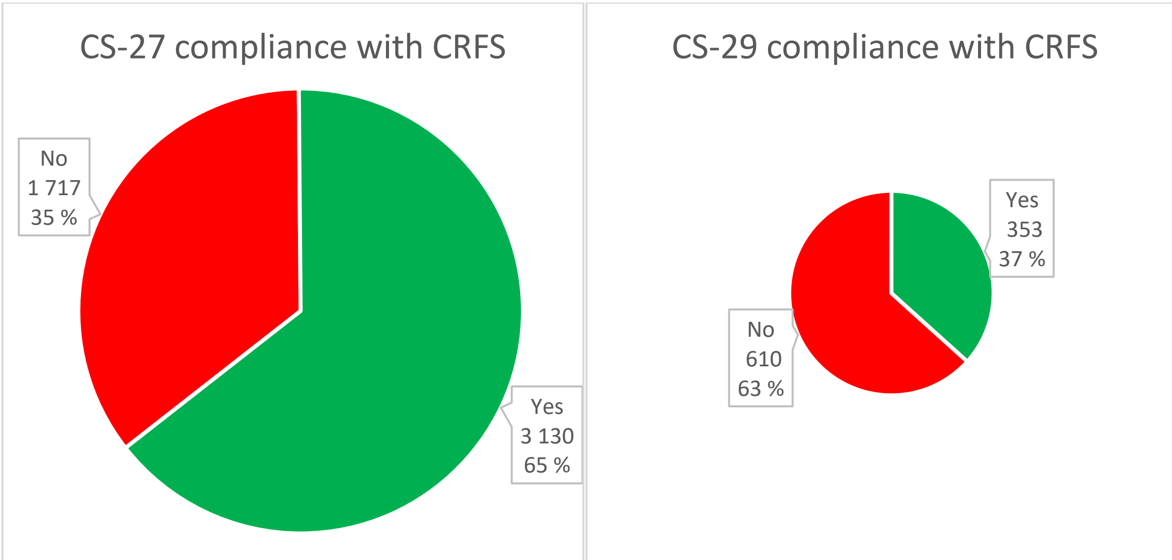
[12] Source: Cirium Fleets Analyzer. Extraction date: 14 April 2020. Includes all civil (i.e. non-military and non-state) CS-27 and CS-29 rotorcraft that are operated by EASA MS operators. EASA Type I rotorcraft are excluded.

Cirium has not seen or reviewed any conclusions, recommendations, or other views that may appear in this document. Cirium makes no warranties, express or implied, as to the accuracy, adequacy, timeliness, or completeness of its data or its fitness for any particular purpose. Cirium disclaims any and all liability relating to or arising out of use of its data and other content or to the fullest extent permissible by law.

[13] Code of Federal Regulations

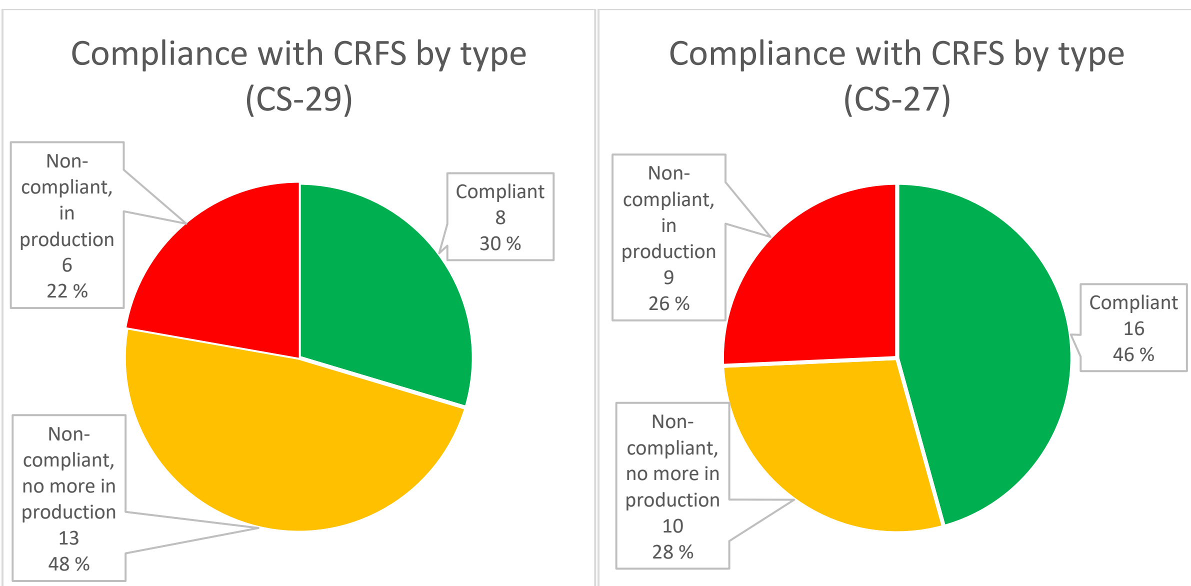
[14] The total fleet is based on 2020 data for all 32 EASA MSs, including the United Kingdom at that moment.

FIGURE 1 – EU ROTORCRAFT FLEET COMPLIANCE WITH CRFS (2020)



Looking at the wider EU rotorcraft fleet, it can be seen in Figure 1 that 35 % of CS-27 rotorcraft and 63 % of CS-29 rotorcraft are not compliant with the CRFS requirements.

FIGURE 2 — EU ROTORCRAFT FLEET COMPLIANCE WITH CRFS BY ROTORCRAFT TYPE



The reasons for the low incorporation rate of the CRFS into the EU rotorcraft fleet are multiple and include the following:

— Modifications to existing designs to make the rotorcraft compliant with the CRFS requirements have not been available to operators.

— Some rotorcraft types are no longer in production, and there is no business incentive for the OEM to design modifications to make the rotorcraft type compliant with the CRFS requirements.

— The operators need to pay the costs of purchasing and implementing the modifications to make existing rotorcraft compliant with the CRFS requirements.

— There are additional operating costs for rotorcraft that were modified to be compliant with the CRFS requirements due to the additional weight (increased fuel costs), loss of available payload (revenue that can be generated), and reduced operating range (due to reduced fuel capacity).

Those reasons are also acknowledged in the EU Safety Rotorcraft Roadmap[15], which calls for defining ways to incentivise safety improvements with regard to airworthiness standards and to investigate further why certain safety improvement actions are not implemented (e.g. an old-design rotorcraft without a CRFS).

4.1.1. Safety risk assessment

Accidents and fatalities due to non-compliance with the CRFS requirements

It should be noted that it is extremely challenging to accurately determine the number of fatalities that would have been prevented in recent rotorcraft accidents through the installation of a CRFS. This is due to the fact that the accident investigation reports do not contain the necessary information to fully evaluate the crash condition, the cause of the fatalities (impact or fire), and the level of occupant protection that is offered to the occupant at the time of the accident. To conduct a full analysis, the following information would be required:

— the configuration of the rotorcraft (fuel tank bladder or not, equipment);

— the location of the occupants;

— the level and detail of the injuries (trauma due to impact (acceleration), blunt force trauma (contact with structure or loose items), thermal injuries (burns);

— the cause of death (thermal injuries or impact);

— the configuration at the time of the impact (speed, attitude); and

— the post-crash fire that is initiated on impact or some time after the impact (i.e. occupants could have egressed before the fire started).

As this information is typically not contained in an accident report, it is difficult to determine the effects of not having a CRFS in a survivable accident. Ideally, in the future, accident investigation reports should be improved by systematically adding a dedicated chapter on survivability including the aforementioned elements.

To ascertain the scale of the safety issue, it was necessary to make a judgement based on various information sources and methods.

[15] Section III.1 'Create market incentives to push for Safety / Environmental improvements (December 2018).

One of the methods applied was to quantify the fatalities in the European Union by interpolation of US accidents and fatalities with regard to the EU fleet. US rotorcraft accident data was thoroughly reviewed by the ARAC ROPWG, to establish the number of preventable fatalities through the introduction of a design change that is compliant with the CRFS requirements, and is therefore a valid source of information. Due to the different fleet size and distribution of the types/models of the EU rotorcraft fleet, a comparison with the US accidents and fatalities could not be directly drawn. However, it is possible to use rudimental interpolation based on a comparison of the fleet size to establish the order of magnitude of the preventable fatalities, as shown in Table 2:

TABLE 2 – CALCULATION OF THE RELATIONSHIP BETWEEN THE US AND EU FLEET SIZE TO DETERMINE THE INTERPOLATION FACTOR

Category/ Class	EU fleet size	US fleet size	Fleet factor	US fatalities	Fatality factor used	Interpolated EU fatalities
Part/CS-27 rotorcraft	4 847	9 819	0.49	43	0.49	**21**
Part/CS-29 rotorcraft	963	960	1.00	8	1.00	**8**

Another method was to review EU accident data and fatalities for the period 2009–2018. 48 fatal rotorcraft accidents (123 fatalities) were reviewed in the light of CRFS to determine the number of potential fatalities that could have been prevented through improved CRFS requirements. A further review of the data set for CRFSs was conducted to remove rotorcraft that were known to already comply with CRFS requirements. A third level of detailed review of those accidents was conducted to establish if the accidents and fatalities could have been mitigated by complying with the CRFS requirements.

The review resulted in the following accidents and fatalities:

TABLE 3 – RESULTS OF THE REVIEW OF EU ACCIDENT DATA FROM 2009-2018 IN THE LIGHT OF CRFS

Category	Number of accidents	Number of fatalities	Number of fatalities that could have been prevented if a post-crash fire had not occurred
CS-27	11	27	**11**
CS-29	0	0	**2**[16]
Total	**11**	**27**	**13**

[16] For CS-29 rotorcraft, there was only 1 accident with 13 fatalities after the filters had been applied. This accident was unfortunately not survivable; therefore, it was not possible to identify through the accident review any fatalities that would have been prevented for CS-29 rotorcraft, had the CRFS requirements been in place. However, by using the US Civil Aerospace Medical Institute (CAMI) 16 % factor and applying it to the total number of fatalities that were identified for CS-29 rotorcraft, it was possible to derive a figure of 2 fatalities.

After the EU accident review was conducted, using the data set for the period 2009–2018, EASA received SRs for the following accidents that resulted in fatalities due to a post-crash fire:

— an AS350 B3 Airbus helicopter, registered LN-OFU, crashed in the Skoddevarre mountains near Alta (Norway) on 31 August 2019, resulting in 6 fatalities; and

— an AS350 Airbus helicopter, registered CS-HFT, crashed in Portugal on 5 September 2019, resulting in 1 fatality.

The fact that in those 7 fatalities, the cause of loss of life has been determined to be post-crash fire further corroborates the risk of fatalities due to a post-crash fire for rotorcraft that are not fitted with a CRFS, and supports the range of the estimated number of preventable fatalities.

A lack of detailed information about the cause of death in the remaining accident reports does not allow to definitively determine if a fatality could have been prevented, had the rotorcraft been compliant with the CRFS requirements, therefore reducing the likelihood of a post-crash fire. In addition, it is difficult to determine if an accident would have been survivable if the post-crash fire had not occurred. Therefore, a factor of 16 %[17] of all fatalities in rotorcraft accidents involving a post-crash fire with thermal injuries was used and applied in the EU context to determine if an accident would have been survivable. The results are shown in the last column of Table 3.

For CS-29 rotorcraft, there was only 1 accident with 13 fatalities after the filters had been applied. This accident was unfortunately not survivable; therefore, it was not possible to identify through the accident review any fatalities that would have been prevented for CS-29 rotorcraft, had the CRFS requirements been in place. However, by using the FAA Civil Aerospace Medical Institute (CAMI) 16 % factor and applying it to the total number of fatalities that were identified for CS-29 rotorcraft, it was possible to derive a figure of 2 fatalities.

Applying different approaches and considering the subjective nature of determining the fatalities relating to CRFS, it is assumed that the following range of fatalities could have been prevented, had the rotorcraft been compliant with the CRFS requirements.

TABLE 4 – SUMMARY OF POTENTIAL PREVENTABLE FATALITIES WHEN USING A CRFS

Category	Range of preventable fatalities
CS-27	11–27
CS-29	1–8
Total	**12–35**

17 This factor was established by the ARAC ROPWG and is based on US data on injuries and fatalities for the period 2009–2017 for which the cause of death was thermal injury according to the reviewed autopsies.

4.1.2. Who is affected

The issue explained above affects several stakeholders in a different way, depending on the policy options:

— all design organisation approval (DOA) organisations in EASA MSs, which design rotorcraft;

— all production organisation approval (POA) organisations in EASA MSs, which produce rotorcraft; and

— all rotorcraft operators in EASA MSs (ca 2 300), which perform different types of activities (commercial air transport (CAT) operations, non-commercial operations with complex-motor-powered aircraft (NCC), non-commercial operations with other than complex-motor-powered aircraft (NCO), specialised operations (SPO)). There are 1 763 operators with only one rotorcraft, 605 of which have in their fleet a rotorcraft that is not compliant with the CRFS requirements.

4.1.3. How could the issue evolve

To estimate the future number of rotorcraft that are compliant with the CRFS requirements in the fleet of EASA MS operators, the current fleet was divided into four groups:

(a) still-in-production rotorcraft that are compliant with the CRFS requirements;

(b) still-in-production rotorcraft that are not compliant with the CRFS requirements;

(c) no-longer-in-production types that are compliant with the CRFS requirements; and

(d) no-longer-in-production types that are not compliant with the CRFS requirements.

For the whole fleet, an average annual 1-% growth rate was applied. In each of the above four groups, a part of the in-service fleet retired every year based on their age[18]. In the model, retired rotorcraft are replaced by new deliveries, and there are additional new deliveries to allow the 1-% annual growth rate of the whole fleet. The model distinguishes between new deliveries of types that are and are not compliant with the CRFS requirements. A new type is assumed to appear on the market every year and then the oldest type is assumed to go out of production. Figure 3 shows the future evolution of the issue if no action is taken. Currently, 40 % of the EU rotorcraft are not compliant with the CRFS requirements. The share of rotorcraft that are not compliant with the CRFS requirements will remain more than 20 % by 2030, and it will still be 10 % in 2045.

[18] The model uses a probability of retirement based on the age of the rotorcraft. In short, the older the rotorcraft, the higher the probability that it is going to retire in a given year. (The relationship is not linear, it has a shape similar to an S-curve: young rotorcraft are very unlikely to retire, 'mid-aged' rotorcraft (20–40 years old) have a relatively higher retirement rate, and very old ones (older than 40) tend to have a slower retirement.) In the model, all still-in-service rotorcraft that are older than 50 retire although, in reality, there are rotorcraft that are still in service after 50 years of age.

Figure 3 — Number and share of EASA-MS operators' rotorcraft that are not compliant with the CRFS requirements (2020–2054)

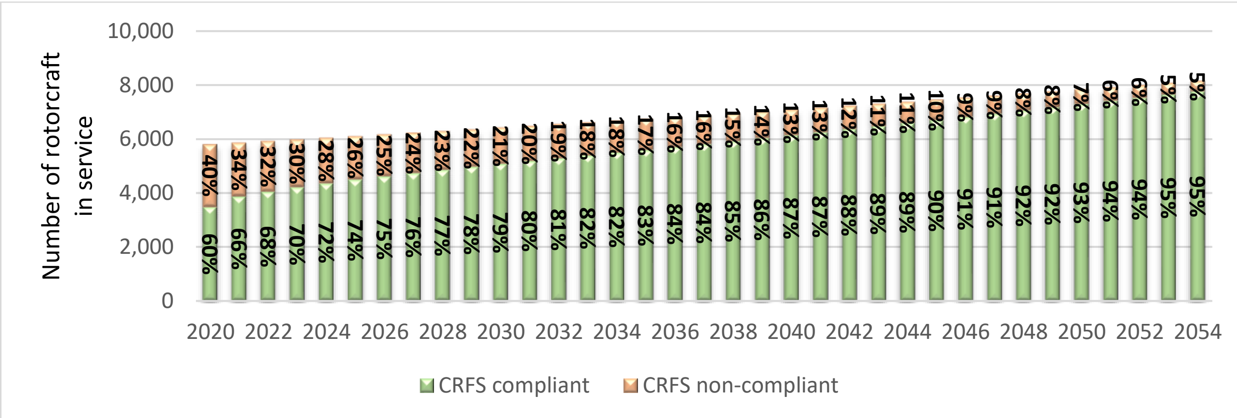


Figure 3 shows that over time, the share of the EU rotorcraft fleet that are not compliant with the CRFS requirements will reduce due to the retirement of older individual rotorcraft and due to rotorcraft types leaving the market (no longer being produced). Eventually, the whole EU rotorcraft fleet will be compliant with the CRFS requirements, but that this will be at a date that is considerably far in the future according to Figure 3. In the meantime, operators will continue to operate and carry passengers in rotorcraft with older designs that do not offer the same level of protection to the occupants in the event of a crash. The exposure to and the level of this risk will reduce over time.

4.2. What we want to achieve — objectives

As described in Section 2.2, the specific objective of this NPA is to mitigate the risks linked to a post-crash fire involving a rotorcraft, thus improving rotorcraft occupant protection in the event of a survivable crash. This can be achieved by increasing the number of rotorcrafts that are fitted with a CRFS. This objective is directly linked to a safety priority in the EU Safety Rotorcraft Roadmap.

Compliance with the CRFS requirements is expected to provide that protection to the occupants and thus contribute to improving safety.

4.3. How we want to achieve it — options

The above-mentioned objective can be achieved in different ways. The proposed options would affect a different size or proportion of the EU rotorcraft fleet. These options are also based on the ARAC ROPWG approach to and analysis of the occupant protection requirements for CRFSs, which pragmatically consider that partial compliance still offers a significant level of post-crash fire protection compared to full compliance.

TABLE 5 – PROPOSED OPTIONS FOR RMT.0710 PHASE 1 THAT ADDRESSES THE CRFS

Option No	*Short title*	*Description*	**Affected fleet**
0	No change	No changes in occupant protection for new and existing rotorcraft	38 types/ 2 327 rotorcraft
1	Minimal changes to introduce retroactive CRFS requirements for newly manufactured rotorcraft as of 2025	Amend Part/CS-26 to require compliance with the minimum CFRS requirements for newly manufactured aircraft that are operated or registered in Europe	14 types/ 1 191 rotorcraft
2	Option 1 plus: as of 2030, retroactive CRFS requirements for existing EU-registered rotorcraft that were type-certified in or after 1978	Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured rotorcraft and existing rotorcraft that are certified in or after 1978	18 types/ 1 310 rotorcraft (incl. Option 1)
3	Option 1 plus: as of 2030, retroactive application of CRFS requirements to the whole existing EU rotorcraft fleet	Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured rotorcraft and the whole existing rotorcraft fleet	24 types/ 2 443 rotorcraft (incl. Option 1)
4	Option 1 plus: as of 2030, retroactive application of CRFS requirements to the existing fleet of rotorcraft with five or more seats	Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured rotorcraft and the existing rotorcraft with five or more seats	22 types/ 2 128 rotorcraft (incl. Option 1)
5	Option 1 plus: as of 2038, retroactive application of CRFS requirements to the whole existing EU rotorcraft fleet	Amend Part/CS-26 to require compliance with the minimum CRFS requirements for newly manufactured rotorcraft and the whole existing rotorcraft fleet	24 types/ 1 851 rotorcraft (incl. Option 1)

4.4. Methodology and data

4.4.1. Methodology applied

Data collection

In terms of data collection, the following data sources have been used:

— Cirium database regarding the total EU fleet in 2020 and in the period between 2008 and 2019;

— EASA accident and incident database for the period 2008-2019 for analysing the safety issue and estimating the potential benefits in case of mandating CRFS requirements;

— EASA standardisation data for 2019-2020; and

— ARAC ROPWG reports:

  — Task 5 'Crash Resistant Fuel Systems (CRFS) Final Analysis Report to the ARAC', submitted on 15 March 2018; and

  — Task 6 'Final Analysis Report to the ARAC', revised on 27 September 2018.

The limitations in analysing the above-mentioned data are presented in the related sections of the IA.

Data analysis

In terms of data analysis, the IA was carried out, using the following two complementary methods:

— a cost-benefit analysis (CBA) with quantification and monetisation of the respective benefits and costs for each option; and

— cost-effectiveness analysis of the total costs per prevented fatality, comparing the cost per prevented fatality for each option to identify the most efficient option;

A comparison of the options was conducted using a CBA. The CBA includes the following assumptions and uncertainty:

— The standard CBA includes estimates of the benefits, considering the preventable fatalities. The analysis does not monetise benefits of preventable injuries, damages, and insurance premiums, due to the lack of commonly acceptable rates. However, those elements are considered as potential benefits and qualitatively specified in the analysis.

— The benefit of preventing fatalities is monetised by using an estimated value for a prevented fatality, which is EUR 3.8 million[19].

— It is difficult to accurately determine the number of fatalities that could be prevented through compliance with the CRFS requirements.

— The increase in operator costs could be accepted with the purchase of a newly produced rotorcraft, when selecting the rotorcraft type. The CBA was carried out, using the upper end of the scale of the

[19] European Commission: Better regulation "Toolbox", p 245-6 (https://ec.europa.eu/info/sites/info/files/better-regulation-toolbox_2.pdf).

preventable fatalities (refer to Table 4): 27 fatalities for CS-27 and 8 for CS-29, with the assumption to check the economic viability of the different options, considering these ultimate benefits.

— The costs that are used were provided by industry to the ARAC ROPWG and are considered excessive and very pessimistic.

— There should be very low non-recurring costs for the development and certification of design changes to newly produced rotorcraft due to the fact that the majority of rotorcraft already have design solutions available for CRFSs as they need to comply with the US law amendment. If the rotorcraft type is already produced for the US market, then there should be no development costs.

In the CBA, all financial values were discounted to year 2020, using a 4-% discount rate[20]. The economic costs were estimated based on information from the ARAC ROPWG and include the following values that were used in all options:

- non-recurring design costs per type:
  - still-in-production types:
    - EUR 0.5 million per CS-27 type, and
    - EUR 1 million per CS-29 type, and
  - no-longer-in-production types:
    - EUR 6.5 million per CS-27 type, and
    - EUR 5.3 million per CS-29 type;
- unit production costs per rotorcraft:
  - production ‘cut-in’:
    - EUR 28 000 per CS-27 rotorcraft, and
    - EUR 98 000 per CS-29 rotorcraft,
  - retrofit of already in-service rotorcraft:
    - EUR 131 000 per CS-27 helicopter, and
    - EUR 294 000 per CS-29 helicopter; and
- additional annual operating costs per rotorcraft (equal for production ‘cut-in’ and retrofit of already in-service rotorcraft):
  - EUR 1 900 for CS-27 rotorcraft; and
  - EUR 18 000 for CS-29 rotorcraft.

The majority of the CS-27 rotorcraft operators only have one rotorcraft; therefore, the design and production costs that will be added to the price of the rotorcraft, together with the operational costs,

[20] Ibid., p. 27.

could be a considerable burden for those operators. There are 2 372 rotorcraft operators in EASA MSs. Out of those, 1 763 operators have only one rotorcraft in their fleet, 605 of which are non-compliant.

4.5. What are the impacts

'Question to stakeholders on the economic impacts:

Stakeholders are invited to provide quantified elements to justify the possible economic impacts of the options proposed, or alternatively propose other justified solutions to the issue.'

4.5.1. Option 0 – No policy change

Safety impact

This option will continue to expose rotorcraft occupants to a known potential safety risk.

Considering the evolution of the issue in the future, the non-compliance of the EU rotorcraft fleet with the CRFS requirements for fuel tanks would continue to pose a safety risk to EU rotorcraft operators and occupants, thus negatively affecting safety. As shown in Figure 3, the current 40-% share of rotorcraft that are not compliant with the CRFS requirements will remain above 20 % by 2030, and still be 10 % in 2045. According to the estimates that are explained in the issue analysis, and considering the current accident rate, keeping the status quo may result in around 28.5 fatalities in the period until 2050.

Furthermore, if no action is taken in Europe, there would be a regulatory difference with the US/FAA that have mandated compliance with the CRFS requirements for newly manufactured rotorcraft that are operated or registered in the US. In addition, this may negatively affect European manufacturers and operators that will have to follow two different regulatory requirements.

Economic impact

No negative economic impact is expected.

The rotorcraft models that are currently in production indirectly benefit from the effect of the US law amendment (changes for full or partial CRFS compliance are available for the models that are registered in the US). It is possible that those design changes will also be installed on rotorcraft that are intended for the European market. However, some of those modifications were available as an 'option' for rotorcraft operators when ordering new rotorcraft, and so far, this has not resulted in a significant increase in the number of rotorcraft that are compliant with the CRFS requirements in Europe.

Overall, it is expected that 5 % of the EU fleet that is produced for both the US and EU markets may benefit from its compliance with the US requirements. However, this share is too low to compensate for the potential risk related to the operation of all rotorcraft affected.

4.5.2. Option 1 – Minimal changes to introduce retroactive CRFS requirements for newly manufactured rotorcraft

Safety impact

The safety benefits are estimated to be 8.3 fatalities prevented in the 2025-2050 period. With EUR 3.8 million being the value of each prevented fatality, this would amount to EUR 31.6 million. Using a 4-% discount rate, the present total value of the prevented fatalities would be EUR 13.1 million.

Economic impact

The costs that are analysed in this Option include the following:

— EUR 1.6 million non-recurring design costs for 2 types. Most of the EU rotorcraft types that are still in production have already incorporated CFRS into their design and therefore, modifications and changes have already been designed and are available for those rotorcraft types. There are 12 other types that are affected by this Option, but they already have a design solution available because they are sold in the US market and therefore, have no development costs.

— EUR 19.7 million unit costs for the production cut-in for a total of 1 191 new rotorcraft that will be delivered in the 2025–2050 period.

— EUR 31.2 million additional operating costs.

The total cost of Option 1 would be EUR 46.3 million for the 2025–2050 period.

The cost of the development of fuel tank modifications to meet the CRFS requirements has already been expended to meet the US law and should not be further considered in the economic evaluation of any future options for the installation of CFRSs on newly manufactured rotorcraft. This means that 12 out of the 14 rotorcraft types could have no development costs. However, this is valid for FAR/CS-27 rotorcraft only. Some CS-29 rotorcrafts that are still in production and not compliant with the CRFS requirements are not registered in the US. Therefore, significant design changes would be required for those types. For the types/models that are in-service but no longer in production and have not incorporated the latest CRFS in their type design, the development costs need to be considered in the CBA. In addition, those types/models that are in service may have incorporated certain modifications that could make the introduction of the design changes for a CRFS more complex.

CBA results

Option 1 would result in a negative net present value (NPV): the discounted value of costs would exceed the discounted value of benefits. This is due to the following:

— non-recurring costs for the development and certification of design changes for all 14 rotorcraft types affected by this option;

— unit costs for the design changes that need to be introduced in production; and

— increased operator costs because of the additional weight of the design changes and reduced fuel capacity (and therefore, range).

The CBA for Option 1 assumed that the amendments to Part/CS-26 would be applicable from 2025, and included the 8.3 fatalities that could be prevented from this date onwards as a benefit to offset the additional costs of EUR 52.5 million.

Other considerations/impacts

Beyond the results of the CBA for Option 1, there are other factors that need to be considered:

— Compared to other options, this Option has the lowest economic impact for rotorcraft operators and OEMs, whilst still satisfying SRs and improving safety.

— The average service life of rotorcraft is very long, and even though the CRFS requirements are applicable since 1994, a long time will be needed until the EU rotorcraft fleet is fully compliant with the CRFS requirements (see Figure 3). A rotorcraft that is produced today could be in service for 40 years (at least 10 % of the current EU rotorcraft fleet are over 40 years old). This Option would prevent, as a minimum, rotorcraft that are not compliant with the CRFS requirements from being produced, thereby bringing forward the date for full compliance of the EU rotorcraft fleet.

— The US law[21] creates a difference between the FAA and EASA, requiring newly produced rotorcraft in the US to be compliant with the CRFS requirements, thereby creating a safety difference between the respective fleets.

— There have been several high-profile litigation cases in the US, which have resulted in significant settlement costs (USD 100 million[22]) for rotorcraft operators whose rotorcraft that were not compliant with the CRFS requirements were involved in accidents. There are other ongoing cases that could result in similar high amounts of compensation to survivors of rotorcraft crashes, who suffered serious injuries as a result of a preventable post-crash fire. This poses a risk to the business continuity of some rotorcraft operators.

— Reducing the number of rotorcraft that fly in Europe without CRFSs is an objective of the EU Rotorcraft Safety Roadmap, as a design and maintenance enabler to 'incentivise' safety.

4.5.3. Option 2 — Option 1 plus: as of 2030, retroactive CRFS requirements for existing EU-registered rotorcraft that were type-certified in or after 1978

Safety impact

The safety benefits are estimated to be 8.9 fatalities prevented in the 2025–2050 period. This would mean an additional 0.6 fatalities prevented, compared to Option 1.

21 49 U.S.C., § 44737 became effective in the US on 5 April 2020.

22 https://www.cbsnews.com/colorado/news/dave-repsher-air-crash-settlement/

Economic impact

The costs analysed in this Option include the following:

— EUR 17.6 million non-recurring design costs (an additional EUR 16 million compared to Option 1 to design retrofit solutions for four additional types);

— EUR 35.4 million unit costs (an additional EUR 15.8 million compared to Option 1 to retrofit 119 rotorcraft in 2030); and

— EUR 34.8 million additional operating costs (including EUR 3.5 million for 119 rotorcraft that would be retrofitted in 2030).

Development costs should be considered for retrofitting the existing fleet with CRFSs as those changes would need to be installed on existing rotorcraft that may be in a different configuration than those in production.

CBA results

Option 2 would result in a negative NPV: the discounted value of costs would exceed the discounted value of benefits. This is due to the following:

— non-recurring costs for the development and certification of design changes for:

  — newly produced rotorcraft, and

  — existing in-service rotorcraft;

— unit costs for the design changes that need to be introduced in:

  — newly produced rotorcraft, and

  — existing in-service rotorcraft; and

— increased operator costs because of the additional weight of the design changes and reduced fuel capacity (and therefore, range) for:

  — newly produced rotorcraft, and

  — existing in-service rotorcraft.

The CBA for Option 2 assumed that the Part/CS-26 would be applicable from:

— 2025 for newly produced rotorcraft; and

— 2030 for existing rotorcraft that are certified in or after 1978.

The CBA considered the fatalities that could be prevented from these dates onwards as a benefit to offset the additional costs.

The reason for the split in the applicability dates is that the date of 2030 would allow sufficient time for design changes to be designed, certified, and widely available for installation. This date would also allow rotorcraft operators to plan the composition of their fleets for the future and to decide on the viability of modifying their rotorcraft. 2030 is also favourable for the CBA, since more of the older types that are not compliant with the CRFS requirements will have retired by that date.

The applicable type certification date of 1978 was selected based on the distribution of types in the EU fleet. Rotorcraft that were certified after those dates represent approximately 80 % of the EU rotorcraft fleet. In this Option, the remaining 20 % of the EU rotorcraft fleet that were certified before those dates would not be required to retrospectively comply with the CRFS requirements. It is assumed that those older types will retire from service once they become uneconomical and be replaced with rotorcraft that are compliant with the CRFS requirements.

The costs (non-recurring and unit costs) for the modification of existing rotorcraft are higher than the costs for newly produced rotorcraft (see Section 4.4.1). This is due to the additional challenge of designing (and certifying) changes to existing designs and the difficulties in installing those modifications can be very intrusive as they require dismantling the rotorcraft. The costs for Option 2 were provided by industry to the ARAC ROPWG and are considered to be excessive; they also include the replacement costs (new rotorcraft) for CS-27 rotorcraft that are not viable to be modified.

Other considerations/impacts

Beyond the results of the CBA for Option 2, there are other factors that need to be considered:

— Option 2 would affect the existing EU rotorcraft fleet, which would increase the implementation costs but also the safety benefits, as more rotorcraft would be compliant with the CRFS requirements.

— Option 2 would act as an incentive to have older rotorcraft that are not compliant with the CRFS requirements retired. This will reduce the overall time that is required for the whole EU rotorcraft fleet to be compliant with the CRFS requirements.

— Option 2 would encourage rotorcraft operators to regard the safety of operations as a primary factor when taking economic decisions. From the data available for non-compliance, rotorcraft operators appear to be currently avoiding the negative financial costs of installing optional available systems that are compliant with the CRFS requirements.

— Rotorcraft operators are currently exposed to the risk of litigation if there is an accident involving a rotorcraft that is not compliant with the CRFS requirements. Option 2 would make those operators aware of their duty of care and require them to either modify their rotorcraft or replace them with a type that is already compliant with the CRFS requirements.

4.5.4. Option 3 – As of 2030, retroactive application of CFRS requirements to the whole existing EU rotorcraft fleet

Safety impacts

This option would ensure that the entire EU rotorcraft fleet would be compliant with the CRFS requirements within the compliance time defined, i.e. by 2030.

The safety benefits are estimated to be 16.7 fatalities prevented in the 2025–2050 period. This would mean an additional 8.4 fatalities prevented, compared to Option 1.

Economic impacts

The costs analysed in this Option are the following:

- EUR 44.9 million non-recurring design costs (an additional EUR 43.3 million compared to Option 1 to design retrofit solutions for 10 additional types);
- EUR 185.7 million unit costs (an additional EUR 166.1 million compared to Option 1 to retrofit 1 252 rotorcraft in 2030); and
- EUR 81.3 million additional operating costs (including EUR 50.1 million for rotorcraft that would be retrofitted in 2030).

CBA results

Option 3 would result in a negative NPV: the discounted value of costs would exceed the discounted value of benefits. This is due to the following:

- non-recurring costs for the development and certification of design changes for:
  - newly produced rotorcraft, and
  - existing in-service rotorcraft;
- unit costs for the design changes that need to introduced in:
  - newly produced rotorcraft, and
  - existing in-service rotorcraft; and
- increased operator costs because of the additional weight of the design changes and reduced fuel capacity (and therefore, range) for:
  - newly produced rotorcraft, and
  - existing in-service rotorcraft.

The CBA for Option 3 assumed that the Part/CS-26 would be applicable from:

- 2025 for newly produced rotorcraft; and
- 2030 for all existing rotorcraft.

The CBA considered the fatalities that could be prevented from these dates onwards as a benefit to offset the additional costs.

The reason for the split in the applicability dates is that the date of 2030 would allow sufficient time for design changes to be designed, certified, and widely available for installation. This date would also allow rotorcraft operators to plan the composition of their fleets for the future and to decide on the viability of modifying their rotorcraft. 2030 is also favourable for the CBA, as older types that are not compliant with the CRFS requirements will have retired by that date.

It is assumed that older types will have retired from service once they become uneconomical and be replaced with rotorcraft that are compliant with the CRFS requirements.

The associated costs (non-recurring and unit costs) for the modification of existing rotorcraft are higher than the costs for newly produced rotorcraft. This is due to the additional challenge of designing (and certifying) changes to existing designs and the difficulties in installing those modifications that can be very intrusive as they require dismantling the rotorcraft. The costs for Option 3 were provided by industry to the ARAC ROPWG and are considered to be excessive; they also include the replacement costs (a new rotorcraft) for CS-27 rotorcraft that are not viable to be modified.

Other considerations/impacts

Beyond the results of the CBA for Option 3, there are other factors that need to be considered:

— Option 3 would affect the whole existing EU rotorcraft fleet, which will increase the implementation costs but also the safety benefits, as many more rotorcraft would be compliant with the CRFS requirements, compared to Options 1 and 2;

— Option 3 would act as an incentive to have older types that are not compliant with the CRFS requirements retired. The whole EU rotorcraft fleet would be compliant with the CRFS requirements by 2030, much earlier, compared to Options 1 and 2;

— Option 3 would not allow rotorcraft operators to avoid the costs of implementing modifications that would make their rotorcraft compliant with the CRFS requirements and would provide a level playing field across all EU rotorcraft operators;

— Option 3 would also eliminate the risk of litigation against rotorcraft operators in case of an accident involving a rotorcraft that is not compliant with the CRFS requirements and would require them to either modify their rotorcraft or replace them with a type that is already compliant with the CRFS requirements;

— Option 3 would result in many older rotorcraft types retiring from service, as it would not be financially viable to modify them. This would be especially the case for rotorcraft types with only a few rotorcraft in operation (less than 10) or if the OEM were not be interested in designing the changes that are required to make the rotorcraft compliant with the CRFS requirements. In addition, for some rotorcraft types, it would not be possible to modify the design due to the technical challenges of doing so. Whilst this may incur financial costs for operators (which is considered in the CBA), there could be an additional overall positive safety impact through the retirement of older and less reliable rotorcraft.

4.5.5. Option 4 – As of 2030, retroactive application of CFRS requirements to the existing fleet of rotorcraft with five or more seats

Safety impacts

This Option would ensure that the entire EU rotorcraft fleet would be compliant with the CRFS requirements within the compliance time defined, i.e. by 2030.

The safety benefits are estimated to be 16.5 fatalities prevented in the 2025–2050 period. This would mean that an additional 8.2 fatalities could be prevented (as a result of the retrofit from 2030), compared to Option 1.

Economic impacts

The costs analysed in this Option are the following:

— EUR 33.7 million non-recurring design costs (an additional EUR 32 million compared to Option 1 to design retrofit solutions for 8 additional types);

— EUR 143.8 million unit costs (an additional EUR 124.2 million compared to Option 1 to retrofit 936 rotorcraft in 2030); and

— EUR 76.7 million additional operating costs (including EUR 45.5 million for rotorcraft that would be retrofitted in 2030).

CBA results

Option 4 would result in a negative CBA of EUR 227 million in the 2025–2050 period.

Other considerations/impacts

This Option would affect a large proportion of the existing EU rotorcraft fleet that is not compliant with the CRFS requirements.

This Option provides for proportionality and will mainly affect rotorcraft that conduct CAT operations but not affect rotorcraft that are primarily used for General Aviation (GA).

An analysis of the EU rotorcraft fleet has concluded that the average age of rotorcraft with five or more occupants in the European Union is very young; therefore, it would be beneficial to implement the changes in 2030 to have those benefits over a longer remaining service life.

Requiring compliance with the CRFS requirements for rotorcraft with five or more occupants would limit the risk of a post-crash fire only to rotorcraft with four or less occupants in the event of an accident. This would limit the number of potential fatalities that are caused by a post-crash fire involving a rotorcraft that is not compliant with the CRFS requirements.

This Option was considered as an alternative, more pragmatic option to Option 3 (whole fleet). Limiting the applicability to rotorcraft with five or more occupants would bring about safety improvements from having a rotorcraft that is compliant with the CRFS requirements for CAT operations that are more likely to use larger rotorcraft. Rotorcraft with four or less occupants are more likely to be used for sports and recreation in GA. Therefore, this Option would provide a degree of proportionality that is based on the risk of the type of operation and on the number of people exposed to the risk.

4.5.6. Option 5 — As of 2038, retroactive application of CFRS requirements to the whole existing EU rotorcraft fleet

Safety impacts

This Option would ensure that the remaining (and, subsequently, the entire) fleet would be compliant with the CRFS requirements within the compliance time defined, i.e., by 2038.

Based on a review of the accident and fatality data from Section 4.1.1, it was determined that:

— 13 out of 27 fatalities involved a CS-27 rotorcraft with four or less occupants; and

— 7 out of 11 accidents involved a CS-27 rotorcraft with four or less occupants.

Therefore, the installation of a CRFS would have mitigated the risk of post-crash fire and prevented fatalities that are caused by thermal injuries in those accidents involving a CS-27 rotorcraft with four or less occupants.

The safety benefits are estimated to be 10.5 fatalities prevented in the 2025–2050 period. This would mean an additional 2.2 fatalities prevented, compared to Option 1.

Economic impacts

The costs analysed in this Option are the following:

— EUR 33.3 million non-recurring design costs (an additional EUR 31.6 million compared to Option 1 to design retrofit solutions for 10 additional types);

— EUR 83.6 million unit costs (an additional EUR 64.0 million compared to Option 1 to retrofit 660 rotorcraft in 2038); and

— EUR 41.8 million additional operating costs (including EUR 10.6 million for the rotorcraft that would be retrofitted in 2038).

CBA results

Similar to Option 3, Option 5 would result in a negative CBA.

Other considerations/impacts

— Option 5 would affect the whole existing EU rotorcraft fleet as of 2038, which would increase the implementation costs but also the safety benefits, as many more rotorcraft would be compliant with the CRFS requirements, compared to Option 0.

— Option 5 would act as an incentive to have older types that are not compliant with the CRFS requirements retired. The whole EU rotorcraft fleet would be compliant with the CRFS requirements by 2038, which would be earlier compared to Option 0 by removing (through modification or retirement) the remaining 10 % of the EU fleet that would not be compliant in 2038.

— Option 5 would provide a level playing field across all EU rotorcraft operators as of 2038 and eliminate the risk of a post-crash fire involving a rotorcraft that is not compliant with the CRFS requirements.

— Option 5 would result in many older rotorcraft types retiring from service, as it would not be financially viable to modify them; however, their number would be considerably less compared to Option 3 due to the later compliance date of 2038. Whilst this may incur financial costs for operators (which is considered in the CBA), there could be an additional overall positive safety impact through the retirement of older and less reliable rotorcraft.

— It is expected that the number of rotorcraft that are impacted by this Option could be considerably lower than the number indicated by the IA. This could be because some rotorcraft operators may voluntarily modernise their rotorcraft fleet or retire older types before the 2038 deadline. Such decisions could be driven by other factors, such as the need to comply with noise and other environmental requirements that could be in place before 2038.

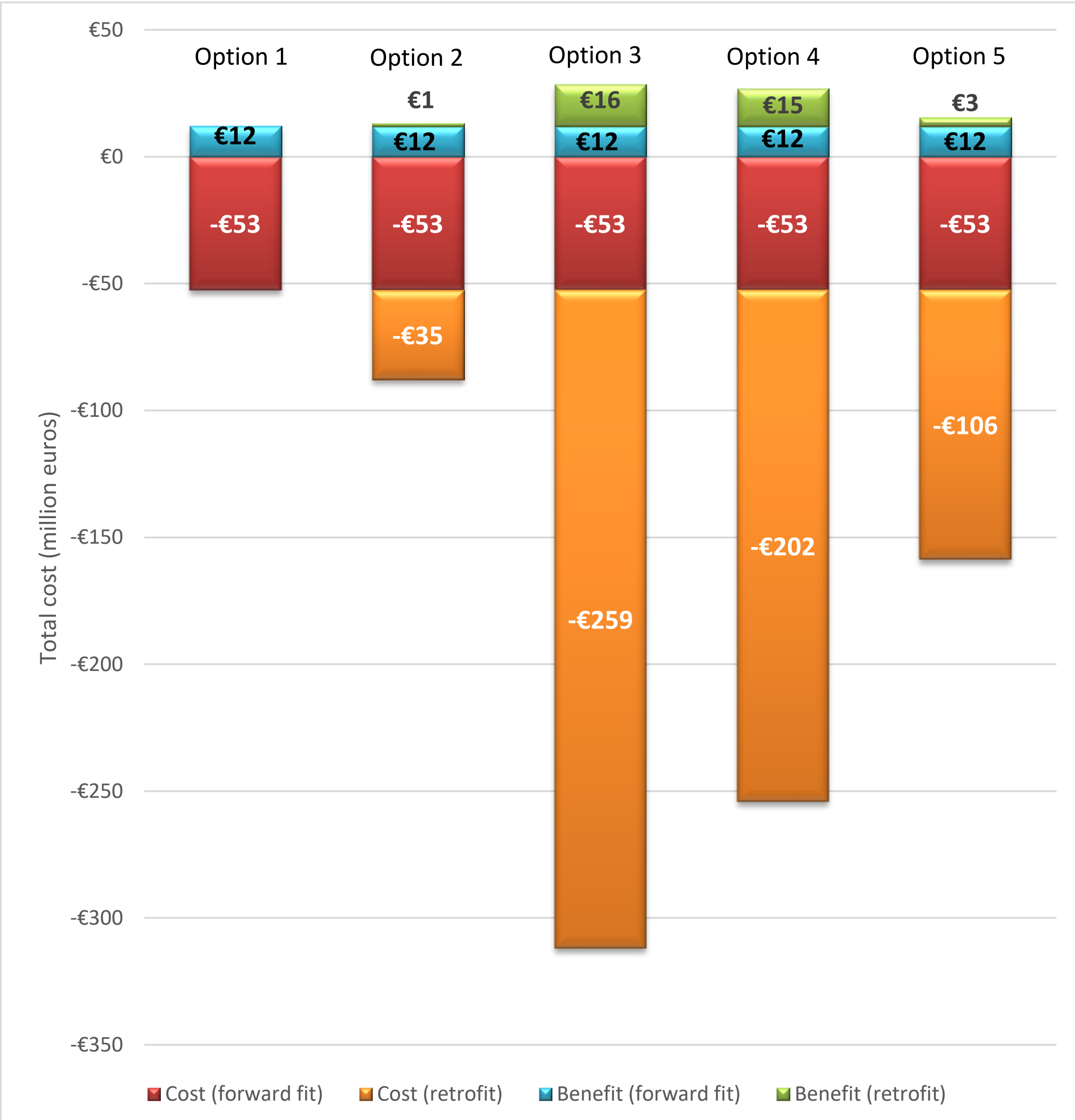
— Option 5 has been considered as an alternative to Option 3 with a later compliance date (2038, compared to 2030 for Option 3). The intent of this Option is to provide more time for operators to decide either to modify or replace their rotorcraft that are not compliant with the CRFS requirements. It is assumed that this Option would encourage operators to voluntarily implement the necessary safety improvements prior to the 2038 enforcement date.

4.6. Conclusion

4.6.1. Comparison of the options

The graphs below depict the overall results of the comparison of the options:

FIGURE 4 – TOTAL COSTS AND BENEFITS OF ALL ANALYSED OPTIONS



In terms of the EU rotorcraft fleet, the impact of each option on the share of the fleet of rotorcraft that are compliant with the CRFS requirements is illustrated below:

FIGURE 5 – SHARE OF THE ROTORCRAFT THAT ARE COMPLIANT WITH THE CRFS REQUIREMENTS FOR ALL ANALYSED OPTIONS

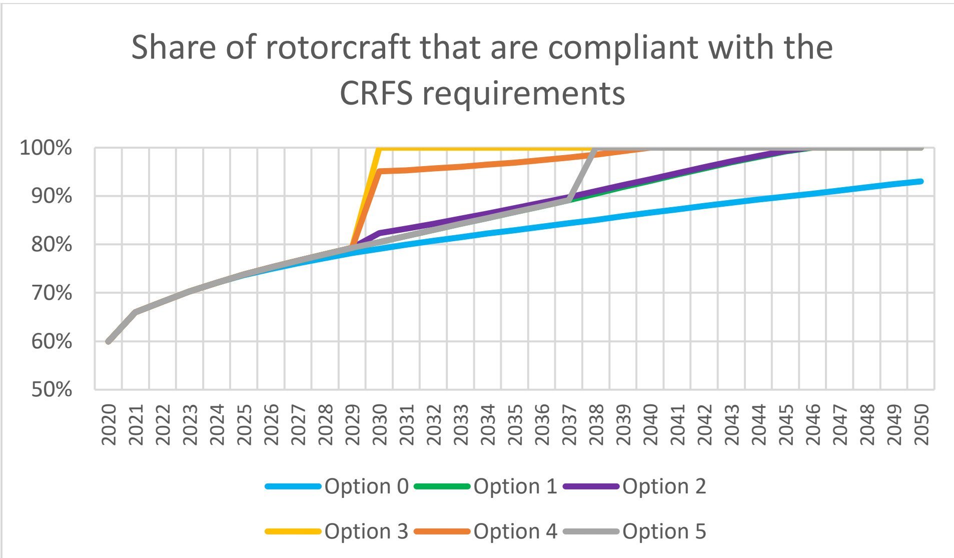


Table 6summarises the results of the CBA for Options 1 to 5. All options have a negative NPV, which means that the total costs of design, production, and operation exceed the total benefits of the value of prevented fatalities.

There are significant differences between the options in terms of cost-effectiveness. Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to all the other options, where a retrofit of already in-service types is also required.

TABLE 6 – RESULTS OF THE CBA IN CUMULATIVE VALUES FOR ALL OPTIONS[23] (2025–2050)

Description	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Number of affected types	14	18	24	22	24
Number of affected rotorcraft	1 191	1 310	2 443	2 128	1 851
Non-recurring costs	-€1 643 854	-€17 648 600	-€44 924 327	-€33 653 346	-€33 268 472
Production costs (unit costs)	-€19 647 181	-€35 414 945	-€185 733 367	-€143 834 950	-€83 630 814
Operating costs	-€31 223 734	-€34 757 034	-€81 326 994	-€76 679 414	-€41 815 431
Total costs (TC)	**-€52 514 769**	**-€87 820 579**	**-€311 984 688**	**-€254 167 710**	**-€158 714 717**
Number of fatalities prevented	8.3	8.9	16.7	16.5	10.5
Value of prevented fatalities (VPF)	€13 124 127	€14 384 740	€30 999 998	€29 341 832	€16 903 039
Net present value (NPV = VPF – TC)	**-€39 390 642**	**-€73 435 839**	**-€280 984 689**	**-€224 825 878**	**-€141 811 677**
Cost per prevented fatality	**-€15 205 287**	**-€23 199 460**	**-€38 243 286**	**-€32 916 735**	**-€35 680 916**

As Options 2–5 are incrementally built upon Option 1, Table 7 summarises the impact of each option, including Option 1. Therefore, Table 8 was developed, to illustrate the non-cumulative impact of the options, i.e. only the difference between the options.

TABLE 7 – RESULTS OF THE CBA IN NON-CUMULATIVE VALUES FOR ALL OPTIONS (2025–2050)

Description	**Option 1**	**Option 2**	**Option 3**	**Option 4**	**Option 5**
Number of affected types	14	4	10	8	10
Number of affected rotorcraft	1 191	119	1 252	936	660
Non-recurring costs	-€1 643 854	-€16 004 746	-€43 280 473	-€32 009 492	-€31 624 617
Production costs (unit costs)	-€19 647 181	-€15 767 764	-€166 086 186	-€124 187 769	-€63 983 633
Operating costs	-€31 223 734	-€3 533 300	-€50 103 260	-€45 455 680	-€10 591 697
Total costs (TC)	**-€52 514 769**	**-€35 305 809**	**-€259 469 918**	**-€201 652 940**	**-€106 199 947**
Number of fatalities prevented	8.3	0.6	8.4	8.2	2.2
Value of prevented fatalities (VPF)	€13 124 127	€1 260 613	€17 875 871	€16 217 705	€3 778 912
Net present value (NPV = VPF – TC)	**-€39 390 642**	**-€34 045 196**	**-€241 594 047**	**-€185 435 236**	**-€102 421 035**
Cost per prevented fatality	**-€15 205 287**	**-€106 426 076**	**-€55 157 351**	**-€47 249 669**	**-€106 792 594**

23 All financial values are discounted to year 2020, using a 4-% discount rate.

'*Question to stakeholders*

Stakeholders are invited to provide any other quantitative information they find necessary to bring to the attention of EASA.

As a result, the relevant parts of the IA may be adjusted on a case-by-case basis.'

The results of the CBA indicate that all proposed policy options are not cost-effective because they incur more costs to the affected stakeholders than the benefits they provide. However, the uncertainties related to the estimation of the potential benefits should be again highlighted (see Section 4.1.1).

All options have a negative NPV, which means that the total costs of design, production, and operation exceed the total benefits of the value of prevented fatalities. In terms of cost-effectiveness, Option 1 is the most cost-effective option: the cost per prevented fatality is significantly lower for the production cut-in of new deliveries compared to any of the other options, where a retrofit of already in-service types is also required.

However, the results of the CBA/cost-effectiveness analysis do not provide the full picture of the effectiveness of the different options, and therefore, the following additional factors should be considered:

— If the current situation that is described in Option 0 remains, this will result in the continued non-compliance with the latest CRFS requirements, thereby not mitigating the safety risks. Indeed, any potentially 'survivable' accident in the future where occupants suffer thermal injuries due to being exposed to an otherwise preventable post-crash fire will come under further scrutiny to establish blame.

— Considering the in-service experience that has been accumulated, along with the SRs and the objectives of the EU Rotorcraft Safety Roadmap to improve safety by reducing the number of rotorcraft that fly in Europe without CRFSs, it would be pertinent to take an action.

— If no action is taken in Europe, there would be a difference with the FAA, which through the US law amendment, which came into force in April 2020, mandated compliance with the CRFS requirements for newly manufactured rotorcraft that are operated or registered in US. This would create a step difference in the accepted safety level between the US and the European Union.

— There have been several high-profile litigation cases in the US, which have resulted in significant settlement costs (USD 100 million for a single occupant[24]) for rotorcraft operators whose rotorcraft were not compliant with the CRFS requirements and were involved in accidents. There are other ongoing cases that could result in similar high amounts of compensation to survivors of rotorcraft crashes, who suffered serious injuries as a result of a preventable post-crash fire. This creates a risk to the business continuity for some rotorcraft operators. These additional costs (e.g. regarding litigation, insurance premiums, etc.) that could be avoided are not included in the model due to lack of reliable data. However, they should be considered alongside the CBA results.

24 https://www.cbsnews.com/colorado/news/dave-repsher-air-crash-settlement/

— The costs (non-recurring and unit costs) were taken from the ARAC ROPWG report and are considered:

  — to be significantly inflated; a single OEM indicated that the actual unit cost could be 50–60 % lower for their rotorcraft types; and

  — to not take into account that EASA (as the FAA) would accept a fuel system that is partially compliant (which has been shown to provide a comparable level of safety as full compliance and has also been accepted by the FAA) with the current CRFS requirements in CS 27/29.952; the costs that are provided in the ARAC ROPWG report are for full compliance only, and the costs could be considerably lower for partial compliance.

— Regarding the benefits in the CBA, it is considered that:

  — there is some uncertainty in the number of preventable fatalities due to the unavailability of accurate data in the accident reports; the actual benefit in terms of preventable fatalities could be higher;

  — the CBA does not include thermal injuries, which have been shown to incur a considerable cost (USD 100 million) in terms of continued medical care and compensation;

  — the CBA does not consider the benefit from avoiding the cost of litigation or liability claims, which would be a significant cost for OEMs and operators; and

  — the CBA does not consider the possible increased insurance costs for operators of rotorcraft that are not compliant with the CRFS requirements.

— In order to meet the objective of the EU Rotorcraft Safety Roadmap, and considering the assumptions and uncertainties in the CBA as well as the additional considerations and possible liability risks in case of future accidents, Option 1 (mandating the CRFS requirements for newly manufactured rotorcraft) is considered as the minimum regulatory change that should be implemented.

— Regarding the existing fleet, purely from the CBA perspective, all Options (2–5) are not deemed to be cost-efficient. However, the non-monetised considerations and the need to improve the safety of the existing fleet call for a pragmatic approach to the retrospective application of the CRFS requirements.

— This pragmatic approach would be in line with Option 4, which would require the installation of a CRFS onto all newly produced rotorcraft as of 2025 and onto all existing rotorcraft with five or more occupants as of 2030. Based on the same approach, Option 5, which requires the installation of a CRFS onto the remaining rotorcraft with four or less occupants as of 2038, should be additionally introduced.

— It is proposed that Option 4 would be the most proportionate option because it would only be applicable to rotorcraft types that are typically used for CAT and passenger-carrying operations. This would not immediately impact those rotorcraft types that are primarily used for GA purposes.

— The introduction of Option 5 for rotorcraft with four or less occupants would be the most suitable action to address the remaining rotorcraft fleet, as it would provide more time (until 2038) for operators to decide either to modify or replace their rotorcraft that do not have a design that is compliant with the CRFS requirements. It is even expected that this Option may encourage operators to voluntarily implement the necessary safety improvements prior to the 2038 enforcement date.

— To substantiate this impact, in parallel to the regulatory change, it is proposed that a safety promotion or complementary non-rulemaking activity is undertaken (e.g. introduction into or raising awareness of the rotorcraft safety ratings, which could incentivise operators to modify or modernise their rotorcraft fleets much earlier than 2038). However, the analysis of such a safety promotion or other activity is not performed under this IA, as the IA focuses only on regulatory changes.

4.7. Monitoring and evaluation

The monitoring of the effects that would be created by the proposed amendments to Part-26 (and the related amendments to CS-26) will consist of the following:

(a) experience gathered by EASA through the requests for the certification of design changes that enable rotorcraft designs to comply with the CRFS requirements that are contained in CS-26;

(b) monitoring the number of post-crash fires and fatalities involving rotorcraft that are designed for five or more occupants after the applicability date of the amended regulation to determine if that number has been reduced; and

(c) monitoring the number of post-crash fires and fatalities involving rotorcraft that are designed for four or less occupants after the applicability date of the amended regulation to determine if that number has been reduced.

Item (a) depends on the applications that will be received by EASA after the amendments of Part-26/CS-26. A review may be conducted no sooner than 5 years after the applicability date of the amendments.

Items (b) and (c) constitute an ongoing review; however, a more detailed review may be conducted no sooner than 5 years after the applicability date of the amendments to establish whether there is a positive trend in the reduction of post-crash fires and fatalities.

5. Proposed actions to support implementation

No implementation support is considered necessary.

6. References

6.1. Related EU regulations

Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18)

6.2. Related EASA decisions

Executive Director Decision 2015/013/R of 8 May 2015 adopting Certification Specifications for additional airworthiness specifications for operations ('CS-26 — Issue 1')

6.3. Other references

— ARAC Rotorcraft Occupant Protection Working Group (ROPWG) Task 5 'Crash Resistant Fuel Systems (CRFS) Final analysis report to the ARAC', submitted on 15 March 2018

— ARAC Rotorcraft Occupant Protection Working Group (ROPWG) Task 6 'Final Analysis Report to the ARAC', revised on 27 September 2018

— ARAC Rotorcraft Occupant Protection Working Group (ROPWG) Task 5 'Crash Resistant Seats and Structure (CRSS) Final Analysis Report to the ARAC', submitted on 29 January 2018

7. Quality of the NPA

To continuously improve the quality of its documents, EASA welcomes your feedback on the quality of this NPA with regard to the following aspects:

7.1. The regulatory proposal is of technically good/high quality

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

7.2. The text is clear, readable and understandable

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

7.3. The regulatory proposal is well substantiated

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

7.4. The regulatory proposal is fit for purpose (capable of achieving the objectives set)

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

7.5. The impact assessment (IA), as well as its qualitative and quantitative data, is of high quality

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

7.6. The regulatory proposal applies the 'better regulation' principles[1]

Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.

Fully agree / Agree / Neutral / Disagree / Strongly disagree

[1] For information and guidance, see:
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how_en
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox/better-regulation-toolbox_en

7.7. Any other comments on the quality of this NPA (please specify)

Note: Your comments on Chapter 7 will be considered for internal quality assurance and management purposes only and will not be published in the related CRD.