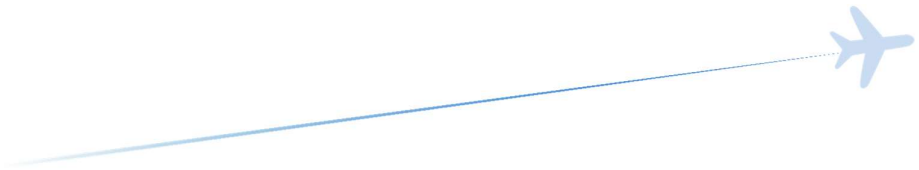

SESAR Solution PJ.10-W2-93 SPR/INTEROP-OSED for V2 - Part III - Environment Assessment Report

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Copyright Statement

PJ10-W2 PROSA

SEPARATION MANAGEMENT AND CONTROLLER TOOLS

This Environment Assessment Report is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 874464 under European Union's Horizon 2020 research and innovation programme.

Abstract

This document is the Environment Assessment Report for the Solution PJ.10-W2-93. It provides a synthesis of essential information (qualitative and quantitative) related to the assessment of the impact on the environment that Solution PJ.10-W2-93 could have when implemented.

For V2, this information comes mainly from expert judgment, as reported in the Performance Assessment Report related to this solution [5], due to the limited scope of the exercise conducted at V2 phase. No Environment Impact Assessment Plan has been developed.

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1 Executive Summary

This document is the Environment Assessment Report for the Solution PJ.10-W2-93. It provides a synthesis of essential information (qualitative and quantitative) related to the assessment of the impact on the environment that Solution PJ.10-W2-93 could have when implemented.

For V2, this information comes mainly from expert judgment, as reported in the Performance Assessment Report related to this solution [5], due to the limited scope of the exercise conducted at V2 phase. No Environment Impact Assessment Plan has been developed at this stage.

Overall, and based on expert judgment, a positive impact is expected in terms of average fuel burnt per flight and CO2 emissions (reduction between 3% - 4% at ECAC level).

Nevertheless, this environment impact assessment results shall be further investigated and confirmed at V3 phase.

2 Introduction

2.1 Purpose of the document

This document describes the results of the activities carried out for the assessment of the environmental impact of SESAR Solution PJ.10-W2-93. At V2 level, the environmental impact has been assessed based on expert judgment, as reported in the Solution Performance Assessment Report for V2 [5]. No Environmental Assessment Plan has been provided at this stage.

2.2 Intended readership

The intended readership of this document are, inter alia:

- the ATM stakeholders (e.g. airspace users, ANSPs, airports, airspace industry),
- the SJU with environmental performance data for the envisaged solution,
- the general public.

2.3 Scope of the document

This document provides an overview of the environmental performance of the SESAR Solution PJ.10-W2-93 extrapolated to the ECAC region. It covers the following environmental aspects:

- fuel used and CO2 generated (at local and ECAC level),
- non-CO2 emissions generated (at local and ECAC level),
- noise at local level.

2.4 Environment work schedule within the Solution

The environmental assessment work for PJ.10-W2-93 was not part of the Solution Validation Plan (VALP) for V2. Therefore, an ad-hoc expert judgment activity (25th March 2021) has been conducted to provide an initial estimation of the environment impact as reported in the Solution Performance Assessment Report [5].

2.5 Structure of the document

This Annex is part of the PJ.10-W2-93 SPR-INTEROP/OSED for V2, and it is composed of the following sections:

- Section 1 is the executive summary
- Section 2 is the introduction section, comprising mainly the purpose and scope of the document.
- Section 3 describes the overall Environment Assessment Process.

- Section 4 gathers the Environment Impact Assessment results of the solution.
- Section 5 contains the references used along the document.

2.6 Terminology

Term	Description
Benefit and Impact Mechanism	A cause-effect description of the impacts of the solution proposed by a project. It describes the positive and the negative impacts that the project solution is expected to provide or demonstrate.
Benefit Diagram	A Benefit and Impact Mechanism is usually shown in a diagram giving an overview of the links between the (new) features that the project is bringing to the world of ATM and indicators (aspects which can be measured or calculated from other metrics), Positive or Negative Impacts for each performance area, and Key Performance Areas (KPAs) or Key Performance Indicators (KPIs). This diagram is supplemented by textual descriptions of the feature, the numbered links and impacts.
Business Case	A Business Case is a tool for decision-makers; it aims to provide them with the information they need to make a fully informed decision on whether funding should be provided and/or whether an investment should proceed. A Business Case is much more than just a financial analysis as it also includes quantitative and qualitative arguments on performance and transversal activities that are key elements to determining the value of the project.
Deployment Scenario	Deployment Scenario consists of a set of SESAR Solutions selected to satisfy the specific performance needs of operating environments in the European ATM System and based upon the timescales in which their performance contribution is needed in the respective operating environments
Environment	Surroundings in which humans interact with the air, water, landscape, natural resources, flora and fauna. In terms of ATM, 'the environment' will be the surroundings in which Air Traffic Management activities are planned or conducted, including research through to development, deployment, and operations.
Environmental Impact	Any modification of the environment that has or could have an effect on the ecosystem. In this document the main environmental impacts of concern are: • Aircraft noise in the vicinity of an airport, • Airport Local Air Quality (mainly CO, NO_x and Particulate Matter), • Global emissions (mainly CO_2) Fuel burnt is also of concern for the environment because of the direct relationship between fuel burnt and CO_2.

Environmental Impact Assessment (EIA)	The process of identifying and evaluating the environmental impacts of projects as well as proposing mitigations to reduce these impacts on the environment. The assessment scope, as it relates to ATM, considers impacts on the environment that can be affected by aircraft operations or that can affect aircraft operations, e.g. through mitigation rules. The main impacts on the environment related to aircraft movements are caused by emissions resulting from fuel burn and noise produced by the engines and airframe.
EIA plan	The Environmental Impact Assessment plan describes the hypothesis to test, metrics to assess, the tools to use, the required input variables for the tools and methodology used for analysing the results.
EUROCONTROL	European Organisation for the Safety of Air Navigation
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme that defines the Research and Development activities and Projects for the SJU.

Table 11111: Terminology

2.7 Acronyms

Term	Description
CO	Carbon Monoxide
CO_2	Carbon Dioxide
IMPACT	EUROCONTROL web portal for the analysis of aircraft noise and emissions
JU	Joint Undertaking
KPA	Key Performance Area
KPI	Key Performance Indicator
LAQ	Local Air Quality
NO_X	Oxides of Nitrogen, including nitrogen dioxide (NO2) and nitrogen oxide (NO).
PM	Particulate Matter
SEL	Sound Exposure Level
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SO_X	Oxides of Sulphur
SPR	Safety and Performance Requirements
VOC	Volatile organic compounds

Table 22222: Acronyms

3 The Environment Assessment Process: Objective and Approach

The SESAR Environment Assessment Process [3] was derived from the ICAO Guidance document (Doc 10031) [4] "Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes" and adapted to the SESAR validation framework.

As can be seen in on the Figure below, which shows the correspondence between the ICAO assessment process (right-hand side) and the one adopted for SESAR (left-hand side), the resulting process is quite generic and straightforward. Results from the environmental impact assessments can also be used to refine the ATM change, making the process cyclic and compatible with the classic Plan-Do-Check-Act approach to validation.

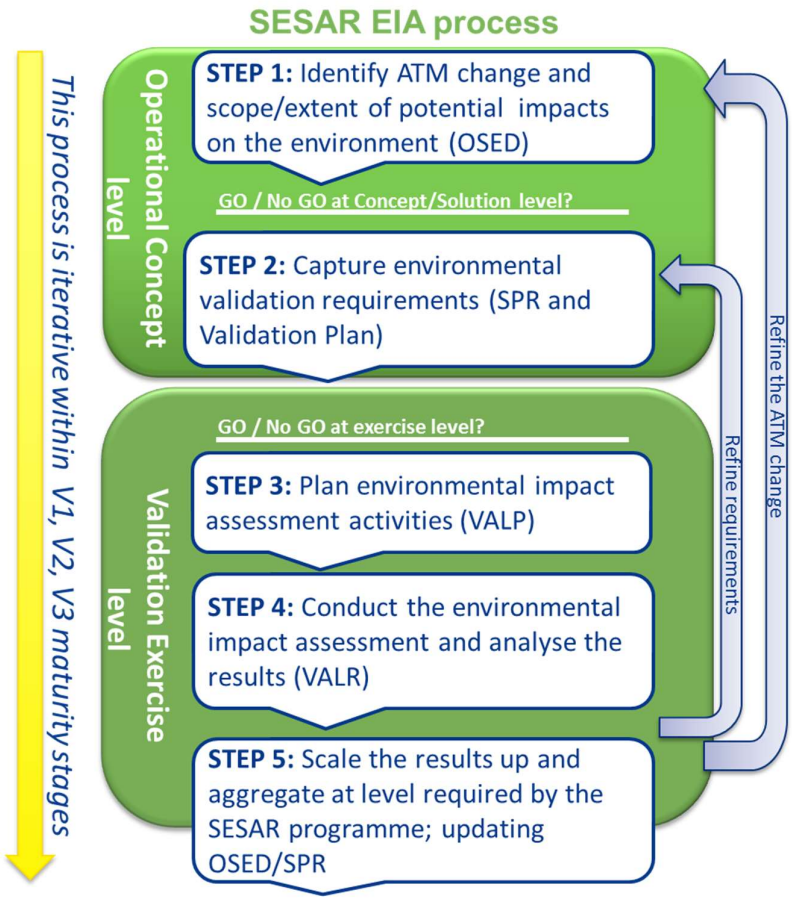

Figure 11111: SESAR environmental impact assessment process.

This process should enable environmental impact assessment activities to be easily carried out as part of the overall validation process where necessary.

The SESAR EIA process consists of 5 main steps:

- EIA Step 1: Identify ATM change and the scope of potential impacts on the environment;
- EIA Step 2: Define environmental validation requirements;
- EIA Step 3: Plan environmental impact assessment activities;
- EIA Step 4: Conduct the environmental impact assessment exercise;
- EIA Step 5: Scale the results up and aggregate.

The SESAR EIA process encompasses two "Go-No-Go" decisions about carrying out further environmental impact assessments. The first one occurs after EIA Step 1 in order to identify very early on in the process whether it is worth undertaking an environmental impact assessment or whether or not more assessments are required later on in the process. The second one occurs at the Exercise level and allows the decision on conducting a detailed environmental impact assessment to be taken before the writing of the validation plan for that exercise. This decision will be based on criteria determined by the validation exercise management. In any case, every "Go-No-Go" decision should be included in the validation plan.

Note that for PJ.10-W2-93 at V2 level, the environment impact assessment has been carried out with ad-hoc activities (not integrated within the solution validation activities) based on expert judgment.

4 Environment Performance Assessment

4.1 Assessment Sources and Summary of Validation Exercise Performance Results

No previous Validation Exercises (pre-SESAR2020, etc.) have been considered for this assessment.

No SESAR Validation Exercises of this Solution (completed ones and planned ones) have been considered for this assessment. An ad-hoc expert judgment session has been carried out to analyse the environment assessment of the solution.

4.2 Conditions / Assumptions for Applicability

The following Table 3333Table 33~~Table 6~~ summarises the applicable operating environments.

OE	Applicable sub-OE	Special characteristics
En-Route	From low to very high complexity.	Airspace concerning one or more ANSPs.
Terminal	From low to very high complexity.	Airspace concerning one or more ANSPs.

Table 33336: Applicable Operating Environments.

4.3 Environment: Fuel Efficiency / CO2 emissions

Does the Solution impact this KPA? Yes

To reduce the CO2 emissions from flights, it is necessary to reduce their fuel consumption as every tonne of fuel burned generates 3.15 tonnes of CO2 emissions.

4.3.1 Performance Mechanism

The delegation of the provision of ATM services among ATSUs in periods of low demand or due to load balancing purposes will allow AUs to fly more efficient trajectories, as the number of airspace disruptions and flight constraints originated by ATFCM measures might decrease. This could lead to a reduction of the fuel burnt and consequently, a reduction in the CO_2 emissions.

4.3.2 Assessment Data (Exercises and Expectations)

The benefits obtained for FEEF1 have been gathered through expert judgment at V2 phase.

- Based on the performance mechanism previously described and considering current ATM inefficiencies at ECAC level (around 11% attributed to airspace fragmentation), the expectation for the solution is to reduce the actual average fuel burnt per flight between a 3% and 4% by 2035. This could result in 3.9 kg - 5.2 kg of fuel burnt saved per flight.
- Considering the expected reduction in fuel burnt, the expected benefit for CO2 emissions reduction is 12.3 – 16.4 kg CO2 saved per flight (-3% - -4% positive impact).

OI step	Relative benefits contribution to FEFF1	Relative benefits contribution to ENV1
SDM-0217 (CR 03600)	100%	100%
TOTAL	100%	100%

Table 44448: Fuel burn and CO2 emissions saving relative benefit per OI step

4.3.3 Extrapolation to ECAC wide

KPIs / PIs	Unit	Calculation	Mandatory	Absolute expected performance benefit in SESAR2020	% expected performance benefit in SESAR2020
FEFF1 Actual Average fuel burn per flight	Kg fuel per movement	Total amount of actual fuel burn divided by the number of movements	YES	3.9 – 5.2 kg fuel burnt saved per flight	-3% - -4% positive impact
ENV1 Actual Average CO2 Emission per flight	Kg CO2 per flight	Amount of fuel burnt x 3.15 (CO2 emission index) divided by the number of flights	YES	12.3 – 16.4 kg CO2 saved per flight	-3% - -4% positive impact

Table 55559: Fuel burn and CO2 emissions saving for Mandatory KPIs /PIs

Table 6666Table 66~~Table 10~~ is showing the average fuel burn per phase of flight (provided when applicable).

	Taxi out	TMA departure	En-route	TMA arrival	Taxi in
FEFF1 Actual Average fuel burn per flight	Not available	Not available	Not available	Not available	Not available
ENV1 Actual Average CO2 Emission per flight (Kg)	Not available	Not available	Not available	Not available	Not available

Table 6666~~10~~: Average fuel burn and fuel burn savings per phase of flight.

Were there any benefits obtained in SESAR2020 Wave1 for this Solution? No.

If yes, does the S2020 Wave2 performance comes in addition to S2020 Wave1 or replace it?

4.3.4 Discussion of Assessment Result

The benefits obtained at V2 are just an expectation based on expert judgment. These benefits shall be confirmed at V3 phase through further validation activities.

4.3.5 Additional Comments and Notes

N/A.

4.4 Environment: Noise, Local Air Quality, and non-CO2 Emissions

Does the Solution impact this KPA? No

4.5 Overall conclusion on the environmental impact of the Solution

Overall, and based on expert judgment, a positive impact is expected in terms of average fuel burnt per flight and CO2 emissions (reduction between 3% - 4% at ECAC level).

Nevertheless, this environment impact assessment results shall be further investigated and confirmed at V3 phase.

5 References

[1] SESAR Performance Framework (2019), Edition 01.00.01, Dec 2019

https://stellar.sesarju.eu/?link=true&domainName=saas&redirectUrl=%2Fjsp%2Fproject%2Fproject.jsp%3FobjId%3Dxrn%3Adatabase%3Aondb%2Frecord%2F16414675

[2] Methodology for the Performance Planning and Master Plan Maintenance, Edition 0.13, Dec 2017

[3] SESAR, Environment Assessment Process (2019), PJ19.4.2, Deliverable D4.0.080, Sep 2019.

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[4] ICAO CAEP – "Guidance on Environmental Assessment of Proposed Air Traffic Management Operational Changes" document, Doc 10031.
https://www.icao.int/publications/pages/publication.aspx?docnum=10031

[5] SESAR Solution PJ.10-W2-93 SPR/INTEROP-OSED for V2 – Part V – Performance Assessment Report (PAR)