

**NORTH EUROPEAN
FUNCTIONAL AIRSPACE BLOCK
NEFAB**

Feasibility Study

Cost Benefit Analysis

v. 3.0

TABLE OF CONTENTS

1	EXECUTIVE SUMMARY.....	3
1.1	Introduction	3
1.2	Description of approach	3
1.3	Results of the internal cost benefit analysis	4
2	INTRODUCTION.....	9
3	RATIONALE AND PURPOSE OF THE CBA.....	10
4	METHOD	11
4.1	Approach to quantify the internal financial benefits/costs	11
5	SCOPE	13
6	DEPENDENCIES, PRECONDITIONS AND LIMITATIONS.....	15
6.1	Dependencies	15
6.2	Preconditions in the SAAM modelling	15
6.3	Input for internal financial costs	17
7	2015 VISION.....	18
7.1	Summary of internal financial effects by 2015	18
7.2	Financial implications of the Minimum Scenario by 2015	19
7.3	Financial implications of the Performance Scenario by 2015	20
8	2020 MINIMUM SCENARIO.....	22
8.1	Summary of internal financial effects	22
8.2	Internal financial effects per initiative	24
8.3	Distribution of cash flow per IWP over time	26
9	2020 PERFORMANCE SCENARIO	34
9.1	Summary of internal financial effects	34
9.2	Internal financial effects per initiative	36
9.3	Distribution of cash flow per IWP over time	38
10	EVALUATION OF NON-FINANCIAL EFFECTS.....	48
10.1	Internal non-financial effects	49
11	HIGH LEVEL RISK ASSESSMENT AND SENSITIVITY ANALYSIS	50
11.1	General risk assessment	50
11.2	Changes to the discount rate	52
11.3	Relative net benefit contribution of the initiatives	52
12	CONCLUSIONS.....	55

1 EXECUTIVE SUMMARY

1.1 Introduction

This document details the method and results of a high level cost benefit analysis of a Minimum and a Performance scenario for NEFAB 2012-2020. Furthermore a projection has been made for 2030 assuming that the financial benefits and costs in the years 2021 to 2030 will be similar to those of 2020.

The purpose of the CBA is to substantiate internal financial and non-financial benefits and costs related to the NEFAB project. External financial effects to airline operators, passengers and the environment are investigated in a separate Socio-economic Analysis.

The CBA and the Socioeconomic Analysis will together form a part of the Feasibility Study with the purpose to substantiate effects associated with the establishment of NEFAB, and provide evidence that the identified benefits fulfil the overall EC requirements for establishing a FAB, as set out in SES Regulation 550 Article 9/A. This states that FABs shall “be justified by their overall added value, including optimal use of technical and human resources, on the basis of cost-benefit analyses”. It should be added that the EC definition of a cost-benefit analysis is similar to the definition of a feasibility study in the NEFAB terminology.

1.2 Description of approach

The CBA is built up by a number of concrete benefit realisation initiatives, which together describe what needs to be done in order to implement NEFAB. Different degrees of cooperation, harmonisation and integration are foreseen for the two scenarios, which in turn affects the identified benefit potential in each initiative.

In order to evaluate the internal financial implications, only marginal costs and benefits compared to a baseline scenario are accounted for. The baseline describes what the operations would look like 2011-2020 if NEFAB is not established, and includes effects of ongoing developments such as SESAR IP1. The Minimum and Performance scenarios describes the extra effects if the Minimum or the Performance scenarios are implemented.

The CBA has been performed using the cash-flow principle and the discounted cash flow analysis, in accordance with EC Regulation 176/2011 and general financial standards. It is based on current knowledge and assumptions regarding the scenarios, which will need to be further detailed in the development phase. The results will therefore at this stage be associated with uncertainty. The results are based on the data received from the ANSPs. There are also some specific uncertainties related to the calculation of potential savings from ATS optimisation, as a simplified approach has been used for the 2020 Performance scenario.

Overall, however, assumptions have been kept conservative and transparent. All assumptions are clearly detailed, and data and estimates have been validated to the extent possible. Therefore, the estimates in this report are deemed to be of sufficient quality for a high-level analysis of the NEFAB benefit potential.

1.3 Results of the internal cost benefit analysis

The internal cost benefit analysis of NEFAB indicates that the Minimum and the Performance scenario both have a positive overall cash flow for the period 2012-2020 and the Performance scenario has a positive internal net present value.

The higher benefit potential in the Performance scenario is mainly due to a higher ambition level in terms of integration and centralisation of tasks, as well as a more aggressive time line for implementation.

The expected net benefit from 2012 to 2020, expressed as undiscounted cash flows, amounts to 3,0 MEUR in the Minimum scenario and 42,6 MEUR in the Performance scenario. The NPV value of the net benefit amounts to -0,3 MEUR in the Minimum scenario and 18,9 MEUR in the Performance scenario.

The CBA has basically been carried out for the period 2012 to 2020. However, assuming that the benefits and costs will be the same per year in the period 2021 to 2030 as in 2020 a linear prolongation has been made to 2030. This estimate gives a rough indication of the potential long-term net benefits but no detailed assessment of costs and benefits have been made for the period 2021 to 2030. With this long-term view the cash net benefit will reach 46,4 MEUR for the Minimum scenario and 168,7 MEUR for the performance scenario.

Both scenarios will require a financing of a negative cash flow up to 3,9 MEUR for the Minimum Scenario and 7,8 MEUR for the Performance scenario. The maximum cash requirement is in 2015 for both scenarios.

Table 1: Summary of NEFAB internal financial implications per scenario (MEUR)

	2020 Minimum Scenario	2020 Performance Scenario	2030 Minimum Scenario	2030 Performance Scenario
Accumulated value of cash flow	3,0	42,6	46,4	168,7
Net Present Value (NPV)	-0,3	18,9	11,0	51,8
Estimated break-even point (payback time)	2021	2017	2021	2017

The overall financial picture can also be illustrated as shown in the 4 charts inserted overleaf.

The Performance scenario is expected to have a shorter pay-back time, with a break-even in 2017 compared to a break-even in 2021 in the Minimum scenario. None of the scenarios reach break-even by the 2015 milestone, which implies that implementation activities beyond the 2015 Vision will be important in order to support an overall added value for NEFAB.

A key reason for the late break-even point is that a substantial degree of coordination and harmonisation work between the ANSPs will be required 2012-2015. To achieve the NEFAB Vision as “the best performing airspace in Europe”, airspace design activities will be performed, operating procedures and ways of working need to be aligned, and necessary FAB-wide organisation and governance structures need to be put in place.

Figure 1: 2012-2020 Minimum scenario – cash and NPV per year and accumulated (1.000 EUR)

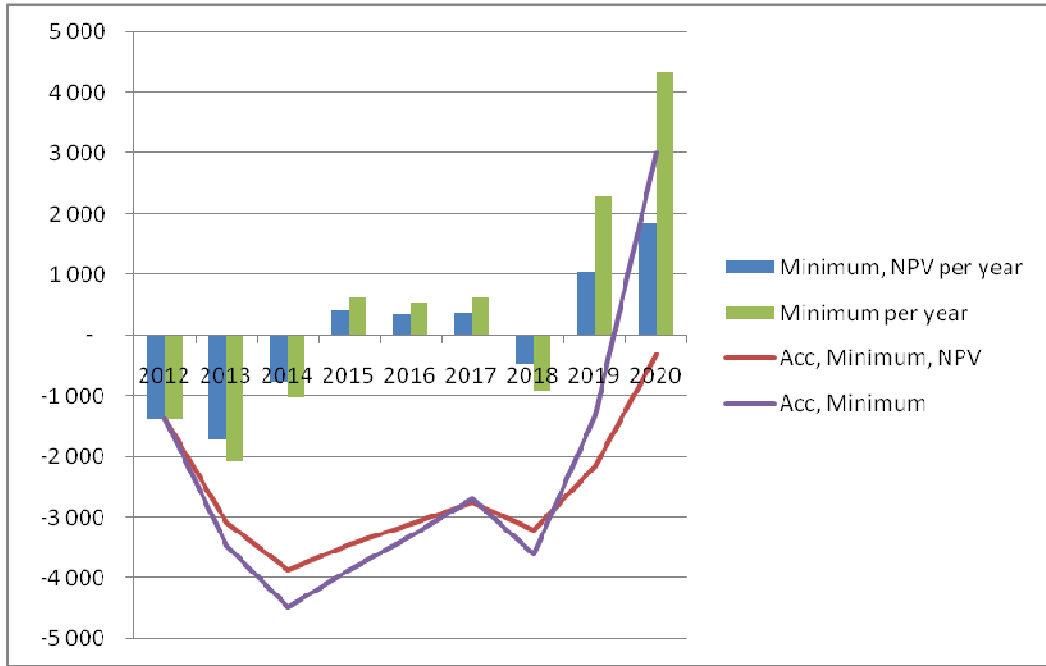


Figure 2: 2012 – 2030 Minimum scenario – cash and NPV per year and accumulated (1.000 EUR)

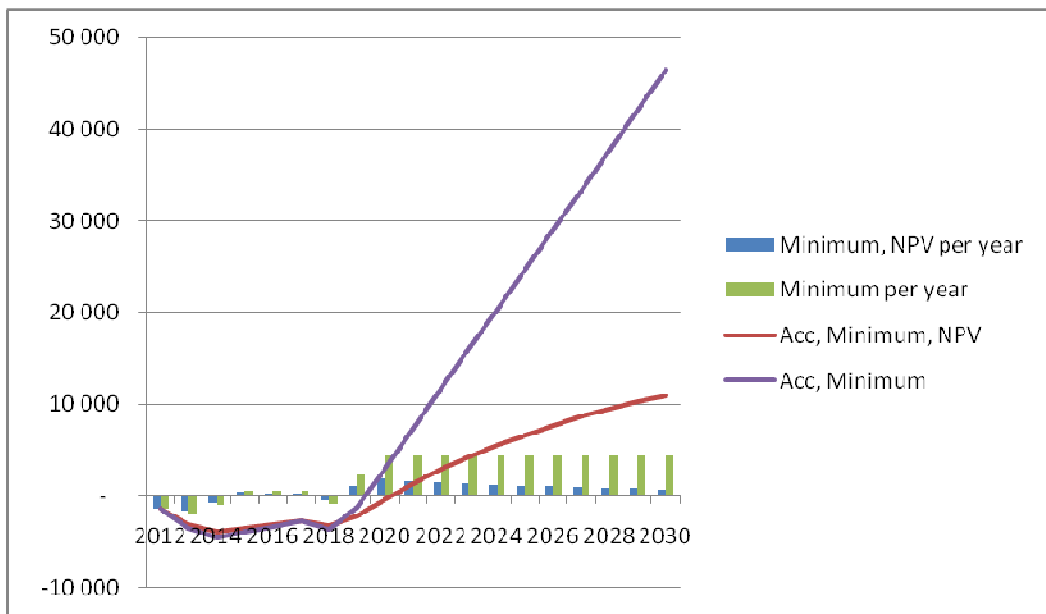


Figure 3: 2012-2020 Performance scenario – cash and NPV per year and accumulated (1.000 EUR)

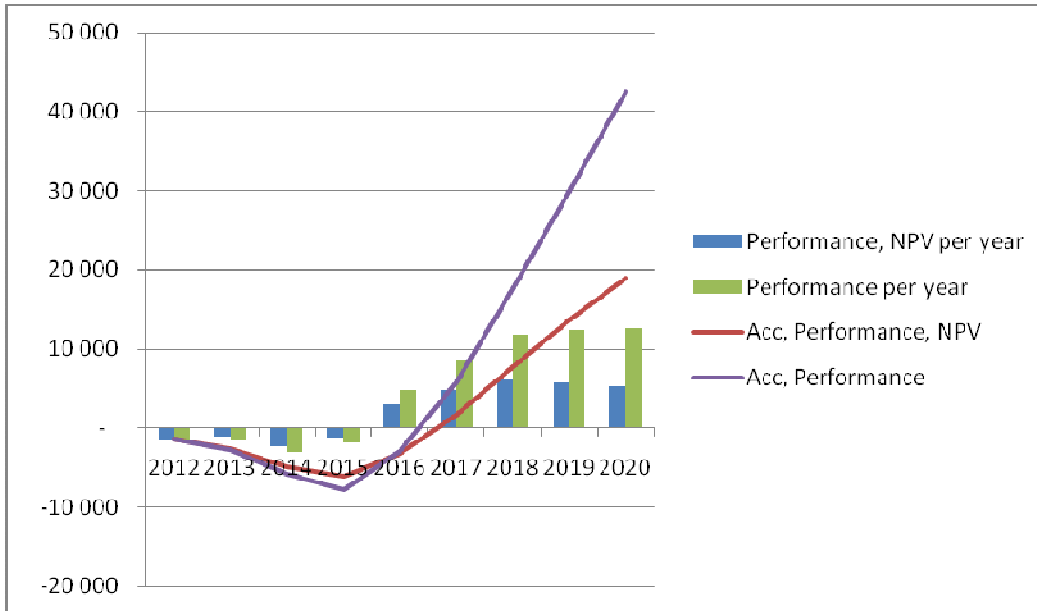
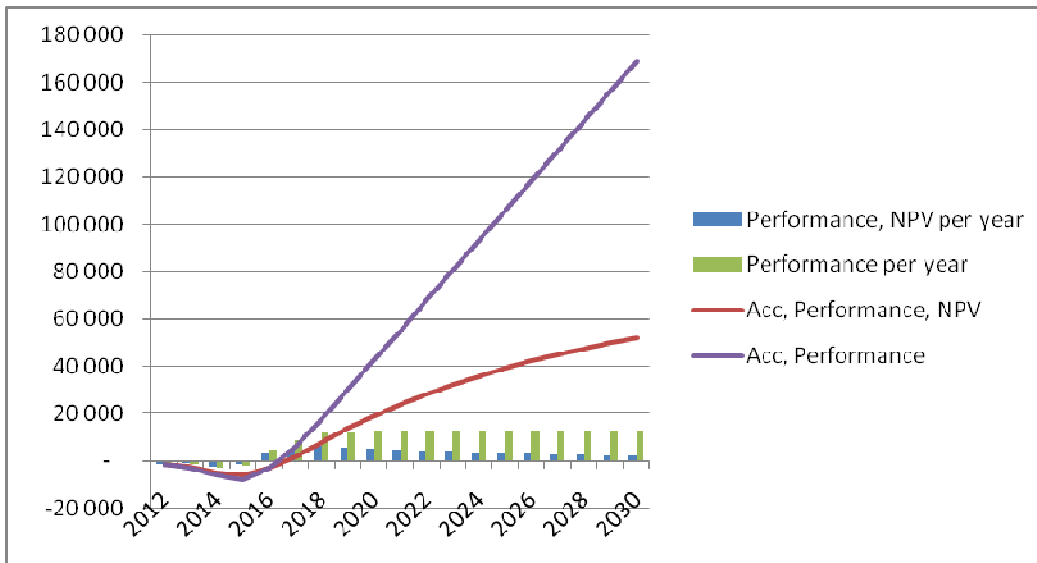


Figure 4: 2012 – 2030 Performance scenario – cash and NPV per year and accumulated (1.000 EUR)



Internal financial benefits have mainly been identified within the following areas:

- Optimised use of ATCOs as a result of airspace improvements and thereby overall reductions in controller workload. This implies that a foreseen capacity increase until 2020 can be managed with a relatively lower increase of ATCOs, hence reducing the future recruitment need.
- Integration and centralisation of tasks and functions, creating potential to reduce overhead, eliminate duplication of tasks and increase specialisation. This is a main benefit area that drives savings especially in the Performance scenario. Among other areas, integration and centralisation is foreseen within ASM & ATFCM, ancillary services, rules and procedures, training, supervision of CNS and safety management
- Common procurement of services, increasing the bargaining power and enabling lower procurement costs. This is foreseen for training as well as for MET services
- CNS infrastructure. Here relative quick wins have been identified, to reduce investment level for system implementation driven by SESAR. Commonality of systems is also foreseen to enable joint level 2 maintenance. Additional potential in terms of investment level is expected to exist but has not been possible to quantify in 2012, as a more detailed understanding of a potential common investment plan in NEFAB is deemed necessary.

The analysis indicates that the level of centralisation and integration is an important factor in order to reap maximum benefits. In the Minimum scenario, the identified internal benefit potential is limited, as foreseen efficiency improvements from harmonisation are restricted. In addition, a very high portion of these benefits are related to one initiative: Optimisation of Training Services. This constitutes a risk in the Minimum scenario, as relatively limited overdrafts in costs, or failure to realise the benefits within Training may significantly delay the payback time, or even result in a negative internal net present value.

Reflections regarding results and suggestions going forward

Given the complexity of cooperation between the ANSPs, together with the regulatory, financial, cultural and language boundaries that exist, and given the time line for implementation, benefit realisation is foreseen to require substantial efforts. Successful implementation of NEFAB, in particular the Performance scenario, will require strong commitment from ANSPs and stakeholders, as well as a clear prioritisation of NEFAB among other ongoing improvement activities.

Nevertheless, the current CBA is seen as a relatively realistic evaluation of the benefit potential in NEFAB. Assumptions and estimates have been kept conservative.

It should be noted that NEFAB also aims to achieve a number of external benefits. These external benefits are accounted for in the Socio-economic analysis, while the costs to realise them will be internal and are accounted for in the CBA. Hence both the internal CBA and the external benefits in the socioeconomic analysis must be taken into account when assessing the overall financial effects of NEFAB.

Moreover, given a desire to increase the internal financial savings and strengthen the business case further, there is potential to expand the scope of current initiatives, or include new areas in the CBA.



In conclusion, while the internal benefit potential for the Minimum scenario is limited, the CBA for the Performance scenario displays significant benefit potential. It is built on integration of a number of tasks and functions, and a relatively ambitious time line. As such it will require strong commitment to realise.

2 INTRODUCTION

This document details the method and results of a high level internal cost benefit analysis (CBA) of a Minimum and a Performance scenario for NEFAB 2012-2020, and with an estimate for 2012-2030.

The Minimum and Performance scenarios consist of a number of concrete benefit realisation initiatives, and are evaluated against a baseline, which describes a reference scenario where no FAB is established.

In the following sections, the purpose, analysis framework and scope of the CBA are presented. This is followed by a description of baseline assumptions, a subsequent analysis of activities until 2015 to fulfil the NEFAB Vision and a full evaluation of the Minimum and Performance scenarios to 2020 and 2030 respectively. Finally conclusions from the assessment are presented.

3 RATIONALE AND PURPOSE OF THE CBA

The purpose of this cost benefit analysis is to substantiate the internal financial and non-financial effects associated with the establishment of NEFAB.¹

The overall objective is to provide evidence that the identified benefits fulfil the overall EC requirements for establishing a FAB, as set out in SES Regulation 550 Article 9/A, which states that FABs shall “be justified by their overall added value, including optimal use of technical and human resources, on the basis of cost-benefit analyses”. This CBA will together with the Socio-economic Analysis give evidence for fulfilment of the EC requirement.

The purpose is also to demonstrate potential benefits of NEFAB to the respective ANSPs and their stakeholders.

In line with the purpose, the cost benefit analysis detailed in this document provides a high-level estimate of potential benefits and costs related to a number of Initiatives within the two scenarios – the Minimum and the Performance scenario.

¹ External benefits will be detailed in a separate socioeconomic analysis

4 METHOD

The overall feasibility study assesses the financial and non-financial effects of establishing NEFAB. These effects can be divided into internal benefits and costs, which are incurred in the ANSPs, and external benefits and costs, providing direct effects to airline operators, the passengers, the environment and other stakeholders.

This CBA will focus on the internal benefits and costs of NEFAB. Financial internal benefits and costs comprise²:

- Increase or decrease in operating costs, which refers to costs necessary for the ongoing operations of NEFAB and include personnel costs, systems costs, etc.
- Implementation costs, which are one-off costs related to the establishment of NEFAB, such as costs for training and competence development, costs for resources in the NEFAB implementation and changes in technical systems.

Costs and benefits included in the CBA and in the Socio-Economic study respectively are summarised below.

Figure 5: Summary and classification of potential costs and benefits

Focus of Cost Benefit Analysis		Internal benefits/costs	External, socioeconomic benefits/costs
Financial benefits/costs		<ul style="list-style-type: none"> • Operating costs (personnel, technology, other operating costs) • Implementation costs 	<ul style="list-style-type: none"> • Value of time savings for passengers • Value of reduced emissions • Value of reduced noise • Reduced airline operating cost
	Non-financial, qualitative benefits/costs	<ul style="list-style-type: none"> • Bargaining power • Influence on regulators • Opportunities for competence development 	<ul style="list-style-type: none"> • Customer orientation, including military issues • Safety • Contingency

4.1 Approach to quantify the internal financial benefits/costs

In order to substantiate the internal effects associated with the establishment of NEFAB, an incremental approach is used, where only additional costs and benefits compared to a baseline scenario are accounted for. The baseline describes what the operations would look like 2012-2020 if NEFAB is not established. Specific assumptions related to this baseline are detailed in chapter 7.

² In theory, internal financial benefits could include increased revenue as well as reduced costs. However, increased revenue is not an expected outcome of the FAB establishment

The baseline has been constructed on an ANSP basis, using forecasts and external growth data related to each ANSP. No consideration has been made for the distribution of benefits. Instead the potential in each initiative has been evaluated using consolidated numbers and weighted average costs, based on the relative number of staff in each ANSP. No individual ANSP cost data is detailed in this report

The NEFAB scenarios that are evaluated are built up by a number of concrete benefit realisation initiatives. These are detailed in separate initiative working papers (IWP), and together the initiatives describe what needs to be done, in comparison to the baseline, in order to implement and develop the Minimum and Performance scenarios.³ While the scenarios build on the same initiative components, different degrees of cooperation, harmonisation and integration, affects the benefit potential for each scenario. Implementation of these initiatives will be done in a step-wise approach, starting in 2012. Benefits will be realised throughout the implementation period and in year 2020 it is expected that all initiatives are fully implemented and operational.

Benefit and cost estimates have been made based on the contents in the initiative working papers by working groups containing ANSP experts and a core CBA production team. Existing studies have been utilised to the extent possible.

To describe the financial implication of the NEFAB scenarios, a net present value (NPV) is calculated using 1/1 2012 as the base year. The NPV of the scenarios is presented both for the specific period 2012-2020, and for savings from 2012 to 2030.

A discount rate of 10% has been used. This corresponds to the EUROCONTROL recommended value of 8% for constant price cash flows, adjusted for an average NEFAB inflation of 2%.⁴

Neither cost of recruitment nor severance costs have been taken into account when quantifying effects related to the number of FTEs. It is assumed that additional human resource requirements can be managed within the boundaries of current organisations, and FTE savings are assumed to be absorbed by natural attrition and result in a reduced recruitment need, rather than redundancies. As the NEFAB area is expecting an overall increase in traffic. This needs to be evaluated further when a more detailed design for each initiative is in place.

³ See CBA per initiative appendices for the Minimum and Performance scenario

⁴ "Standard inputs for EUROCONTROL Cost Benefit Analyses", Edition 4.0, p 37. For NEFAB average inflation rate, see CBA data and growth assumptions

5 SCOPE

The cost benefit analysis contains an evaluation of the following initiatives:

Table 2: NEFAB benefit realisation initiatives

Area	No.	Initiative name	Rationale / Purpose of initiative
Airspace Design	01	ATS route structure and sectorisation	To design and organise the NEFAB route network - consisting of both the fixed ATS route network and Free Route Airspace - and supporting ATC sectors in the en-route airspace and the interface to terminal areas, in such a way that maximum capacity and efficiency of the Air Traffic Management network within the NEFAB airspace is achieved. It is expected that by doing so the ATM related safety levels shall be maintained or enhanced. The initiative is limited to the technical aspects of airspace design. All implications from operations and management in this new airspace design are accounted for in IWP 3 - Optimisation of ATS, and IWP 4 - Optimisation of ASM & ATFCM.
	02	<i>Optimisation of sectorisation</i>	<i>This initiative is deleted as it has been merged into IWP 01 above.</i>
ATM	03	Optimisation of ATS	To utilise the possibilities for more efficient provision of ATS under the NEFAB concept. A new sectorisation and a flexible/dynamic Sector Configuration Management enables improved productivity in ATS delivery and can improve the efficiency and cost effectiveness of Air Traffic Control Services through optimised cooperation and harmonisation regardless of national borders. The initiative details the implications of operations in a new airspace design as described in IWP1, and in accordance with the ASM&ATFCM environment detailed in IWP 4.
	04	Optimisation of ASM and ATFCM	To define an ASM & ATFCM environment where the effects of airspace and/or flow and capacity management related decisions on strategic, pre-tactical and tactical level are evaluated on FAB-wide level resulting in a potential for: <ul style="list-style-type: none"> • increase in capacity through enhanced predictability • improvement of cost effectiveness of ASM/ATFCM related operations by enhancing the use of human resources • improvement of the safety of operations through increased predictability in airspace use and the use of CDM • reduced environmental effect of operations through increased mission effectiveness
Operational support	05a	Ancillary Services - ARO, Briefing & AIS/AIM	Describes the potential for centralisation of ARO, Briefing and AIS/AIM in order to achieve a common interface for customers, providing the same services throughout the NEFAB area. At the same time this enables more cost efficient operations, from personnel reduction and lower systems costs from reduced duplication of tasks and common digitalisation (AIM).
	05b	Ancillary Services – Procurement of MET	Evaluates the potential for common specifications and procurement of MET services and products. The main benefit from common procurement of MET services is cost efficiency driven by lower procurement costs.
	06	Harmonisation of Rules and Procedures	To harmonise operational rules and procedures applied in the NEFAB ANSPs in the provision of air navigation services. It shall create the necessary prerequisites for increased cooperation between the ANSPs in NEFAB, and is an enabler for cross border activities and increased cooperation in several other areas. The initiative also describes the benefits of a coordinated, harmonised or common manual of operations, and benefits from more efficient ways of working and reduced duplication of efforts.
	07	Optimisation of Training services	Describes principles of common training requirements, procedures and plans in the NEFAB area. Common training procedures are a necessary prerequisite for cross border operations as they have direct impact on safety and quality. The initiative also describes potential cost reductions from common procurement of training services within the NEFAB area.

Area	No.	Initiative name	High level purpose of initiative
Systems	08	Supervision and monitoring of CNS infrastructure	Describes the concept for monitoring and control of systems necessary to support for operational ATS within the NEFAB airspace. As such the initiative is an enabler for NEFAB.
	09	Commonality of CNS/ATM systems	To decrease the fragmentation of functionality and infrastructure used within the FAB. The initiative deals with the opportunities provided in the complete system chain from specification to dismounting of systems and infrastructure. It focuses on the advantages for each ANSP if common/similar equipment is implemented and used throughout the FAB. The initiative is an enabler for all different types of benefits that occur through commonly used functionality/infrastructure. The initiative does not detail benefits and costs in relation to the evaluation of new technology or the procurement process itself. These are detailed in IWP 10 and IWP 12 respectively, which are closely linked to this initiative.
	10	Joint evaluation of technology within CNS and ATM	This initiative details the benefits and costs related to joint evaluations of technology for implementation of CNS and ATM Systems. It includes the use of system specialists and project staff for these activities. This evaluation is an important part of the process to make sure that new technology is implemented in the most cost effective way. Emerging technologies relevant to and enabling NEFAB operations should be evaluated jointly in order to fuel the NEFAB harmonisation process. This initiative is the basis for other cooperation within the systems domain (as specified in IWP09 and IWP12).
	11	Common System Maintenance	This initiative investigates the benefit potential of common system maintenance. The purpose of the initiative is more efficient use of staff required for level 2 and 3 maintenance, and at the same time enabling availability to those special competences that are required, but could be difficult for each party to keep in their own organisation due to the small amount and complexity of work provided.
	12	Joint procurement	The purpose of the joint procurement initiative is to set up a process where NEFAB partners jointly go through the entire tendering process with more effective use of resources in the procurement process The initiative also enables savings in the other parts of the systems value chain, e.g. lower investment cost of new systems and more effective maintenance. These benefits are accounted for in IWP09 and iWP10
Safety	13	Safety Management Systems	The rationale behind this initiative is based on three core issues related to Safety Management Systems in NEFAB: <ul style="list-style-type: none"> The need to harmonise SMS before NEFAB is declared and subsequent actions that are required before NEFAB moves into operation; The opportunity to harmonise and integrate SMS beyond the formal needs in order to deliver safety benefits and/or financial benefits; The need to integrate SMS to meet safety performance requirements at FAB-level in accordance with performance regulation; The need to continue integration of SMS in line with future development of NEFAB based on recommendations related to the evolution of the cooperation or changes in organisational structures.

6 DEPENDENCIES, PRECONDITIONS AND LIMITATIONS

This chapter details key dependencies, preconditions and limitations in the CBA.

6.1 Dependencies

Although the scenarios have been broken down into benefit realisation initiatives, these cannot necessarily be implemented independently of each other. On the contrary, many of the initiatives are dependent on the implementation of one or more of the other initiatives. Important enabling initiatives are:

- ATS-routes and sectorisation (IWP01)
- Optimisation of ASM and ATFCM (IWP04)
- Harmonisation of rules and procedures (IWP06)
- Optimisation of training services – harmonised training content (IWP07)
- Safety management systems (IWP13)

There are also initiatives that are closely connected to each other, and that are required to implement together in order to achieve the full identified benefit potential. For example, systems initiatives IWP09, IWP10 and IWP12 all contain benefits from cooperation and common implementation of systems infrastructure.

Furthermore, there are dependencies to the areas evaluated in the CBA initiatives and the parts of the ANSPs that are left outside of the scope. For instance, suggested centralisation of staff may have adverse effects on the remaining ANSP organisations. Such effects have not been possible to evaluate in the CBA, but will need to be assessed in the development and design phases

Finally, there are dependencies to other developments and ongoing improvement initiatives within and between the ANSPs in the NEFAB area. How these are taken into account is described in chapter 7.

6.2 Preconditions in the SAAM modelling

SAAM modelling has been used to develop enhancements to the ATS-route network for the NEFAB 2020 scenarios and sector improvement areas for 2015. The SAAM analysis has been used to assess reductions in route extensions, flight times, fuel burn and CO₂ emissions. Those results are not presented in this internal CBA, as they are drivers of external benefits. As such they are detailed in the NEFAB socioeconomic analysis.

However, the SAAM modelling output for 2015 has been used as a basis to perform calculations regarding potential increase in ATCO productivity and better use of human resources as an effect of the 2015 vision (airspace/sector improvement areas).

Limitations

The CBA provides a high-level assessment of the benefits and costs related to the implementation of each scenario. It is based on current knowledge and assumptions regarding the scenarios, which will need to be further detailed in the development phase. The results will therefore be associated with uncertainty. Areas posing specific uncertainty are listed below:

- Sectorisation, optimisation of ATS, and resulting effects on number of ATCOs
- Full analysis of operational requirements and related system effects
- Quality and comparability of cost data provided by ANSPs, as well as data outstanding
- Validation of benefit and cost estimates by individual ANSPs

Sectorisation, optimisation of ATS, and resulting effects on number of ATCOs

A top down approach has been used to calculate the effects of a new sectorisation on the number of ATCOs and assess the benefit potential in terms of workload.

The model is used to provide a simplified, measurable figure of the potential. The model is based on an analysis of the NEFAB airspace, but should be used for high-level calculation purposes only. Further investigations are necessary for a more detailed understanding of actual potential.

Full analysis of operational requirements and related system effects

All initiatives have been investigated by systems expertise to identify operational requirements and evaluate the financial impact. Hence system implementation costs, to the extent known, have been included in the relevant initiative. However there is some uncertainty associated with systems costs and a full assessment remains to be performed in the development phase.

Quality and comparability of cost data provided by ANSPs

The foundation for calculations performed is baseline data, consisting of cost data provided by ANSPs.

For data still outstanding, no assumptions or adjustments have been made in the calculations. Instead, potential data errors and the expected impact on calculations are stated for each initiative. Details are provided in the appendix.⁵ This provides some inaccuracy in the calculations, but is a transparent approach that avoids compromising the credibility of calculations through the addition of faulty assumptions.

Validation of benefit and cost estimates by individual ANSPs

Work has been ongoing simultaneously with all NEFAB initiatives, and in parallel with other ongoing initiatives in the ANSPs competing for resources. Due to constraints on the human and financial resources available, it has not been possible to involve all ANSPs in all initiative working groups. This creates a risk of bias or errors in

⁵ See CBA per initiative appendices for potential data errors per initiative

estimates due to lack of knowledge and understanding of specific national circumstances.

Overall, assumptions have been kept conservative, and data and estimates have been validated by an ANSP core production team, and with additional subject matter experts to the extent possible.⁶ Therefore, the data and estimates in this report are deemed to be of sufficient quality for the purpose of assessing the benefit potential in the Feasibility Study for NEFAB.

6.3 Input for internal financial costs

The foundation for the baseline scenario is a data request sent out to dedicated CBA contacts in each ANSP, asking for data for each data category required for calculations. Forecasts have been requested to the extent available, as the forecasts made by each ANSP is seen as the best prediction of the future in a no FAB scenario. However, as forecasts have not been available for all years in all ANSPs, this has been complemented by growth estimates from the last forecasted year in the ANSP until 2020.

The complementary growth estimates have been made with involvement from experts in the ANSPs. The following key growth assumptions have been made⁷:

- Concerning the growth rate of staff numbers until 2020, the level of uncertainty is high. Among other things, it depends on traffic complexity and variability in the NEFAB area. Therefore, a conservative approach has been chosen regarding growth estimates for staff categories, see point below.
- With the exception for ATCOs in operations, which are assumed to grow with the relative increase in traffic growth⁸, staff numbers are assumed to remain constant from the last forecasted year in each ANSP until 2020
- Costs are assumed to increase by inflation. The estimated inflation per country is applied⁹

Within systems, ongoing developments and system changes due to fulfilment of European regulations and SESAR IP1 requirements are seen as a part of the reference scenario. They are not seen as a cost for NEFAB, as they would be incurred regardless of the establishment of the FAB.

In certain areas, a baseline has not been possible to construct from current ANSP data. For example, the implementation cost of new systems functionality by 2020 may not be included in investments plans and is highly uncertain. For such items, a conservative estimate of costs and related benefits has been made by the expert working groups within the initiative.¹⁰

⁶ See CBA per initiative appendices for specific assumptions

⁷ For detailed growth assumptions, see consolidated data sheet and CBA growth assumptions

⁸ Traffic growth according to STATFOR high growth model (edition 2009), complemented by a 25% growth on all city pairs, based on the 2015 medium term STATFOR prediction

⁹ Inflation applied per country using "IMF Executive Board Discussion of the Outlook, September 2009"

¹⁰ For details, see CBA data and growth assumptions, and CBA per initiative appendices

7 2015 VISION

This section contains an evaluation of the internal financial implications of activities in the Minimum and Performance scenarios between 2012 and 2015, in order to fulfil the 2015 Vision for NEFAB.

The 2015 Vision is not a separate scenario, but rather an important milestone in both the 2020 Minimum and 2020 Performance Scenario. A full evaluation of the two scenarios is provided in chapters 8 and 9.

7.1 Summary of internal financial effects by 2015

The analysis of internal financial effects indicates that activities in the period 2012-2015 will result in a negative internal present value for both the Minimum and Performance scenario.

A negative cumulative cash flow 2012-2015 can also be expected from the step-wise implementation of initiatives until 2015, as there is substantial implementation work aimed toward the vision for NEFAB as “the best performing airspace in Europe”, while 2015 is a relatively limited time frame for internal benefit realisation. Airspace design activities and harmonisation efforts to enable cross border operations are major cost drivers in both scenarios, together with NEFAB project costs for implementation. As the organisation and governance structures of NEFAB are yet to be developed, it is uncertain whether these will be cost drivers or benefit drivers.

Nevertheless, a number of benefits are foreseen, such as common investments opportunities for CNS infrastructure, procurement of basic training, and reductions in controller hours and integration of functions.

It should also be noted that the 2015 Vision aims to provide substantial external benefits, directly to stakeholders, through a foreseen reduction in route extensions, flight time, fuel burn and CO₂ emissions. These external benefits are accounted for in the socioeconomic analysis, while the costs to realise them will be internal and are accounted for in the CBA.

The internal financial implications of the two scenarios until 2015 are summarised in the table and figures on the next page.

Table 3: Summary of net present value 2012 to 2015 [MEUR]¹¹

Area	Initiative	Minimum Scenario	Performance Scenario
Airspace Design	01 - ATS route structure and sectorisation	-908	-1856
ATM	03 - Optimisation of ATS	60	-5546
	04 - Optimisation of ASM and ATFCM	-1026	-874
Operational support	05a – Ancillary Services - ARO, Briefing & AIS/AIM	-367	-1084
	05b – Ancillary Services – Procurement of MET	0	-51
	06 - Harmonisation of Rules and Procedures	-1052	265
Systems	07 - Optimisation of Training services	-77	1508
	08 - Supervision and monitoring of CNS infrastructure	-414	-330
	09 - Commonality of CNS/ATM systems	1323	878
	10 – Joint evaluation of technology within CNS and ATM	197	231
	11 - Common System Maintenance	42	875
Safety	12 - Joint procurement (of systems)	-204	10
	13 -Safety Management Systems	-1016	-216
Net present value of discounted cash flow 2012-2015		-3441	-6190

7.2 Financial implications of the Minimum Scenario by 2015

In the Minimum scenario, the negative cash flows anticipated by 2015 primarily consist of staff costs for implementation, as resources are required to conduct development and implementation work.¹²

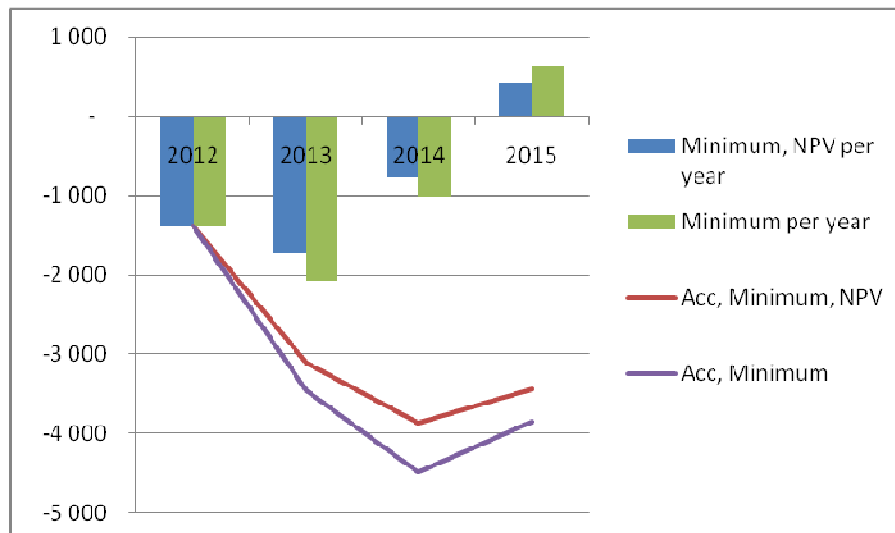
Commonality of systems is a strong contributor to benefits until 2015, as relative quick wins have been identified for system implementations driven by SESAR that each ANSP will be required to invest in. Savings are identified through common implementation of SUR technology, enhanced data link, AMHS and NET. Benefits are also identified from reduction of radar over-coverage in the NEFAB area and sharing of procurement specifications.

The cash and discounted cash flow per year attributed to the net-benefit is shown below. The cumulative effect, showing the net present value in each year, is displayed in the same graph. The graph below indicates that a break-even will not be reached by 2015.

¹¹ Airspace design does not result in any internal financial benefits, as resulting benefits in terms of sector staffing is accounted for in IWP03 and IWP04. It is also a main driver for socioeconomic effects

¹² Although it is assumed that the resources required for implementation exist in the current ANSP organisations and that no recruitment will be necessary, these resources represent a cost to implement NEFAB, and are as such included in the CBA calculations

Figure 6: 2012 – 2015 Minimum scenario – cash and NPV per year and accumulated (1.000 EUR)



7.3 Financial implications of the Performance Scenario by 2015

Just as for the Minimum scenario, the negative cash flows anticipated by 2015 in the Performance scenario primarily consist of staff implementation costs.¹³

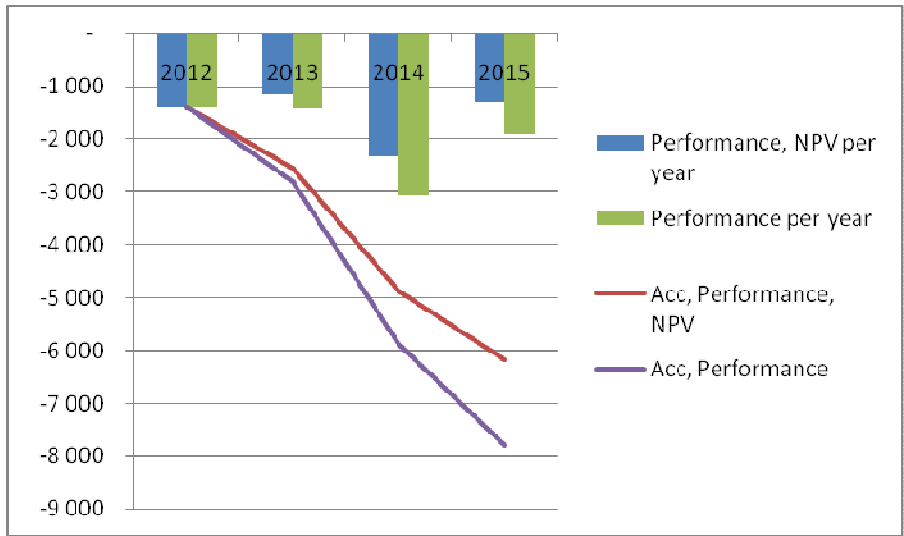
The scenario displays higher costs, but also significantly higher benefits in the years after 2015. These higher benefits are a result of focusing on integration rather than harmonisation, as well as a more aggressive time line for benefit realisation. Additional benefits in the Performance scenario stem from:

- Integrated functions foreseen to be implemented by 2014 within Rules and Procedures, Training and Safety Management (2020 in the Minimum scenario)
- Earlier benefit realisation within ATM, as reduction in route extensions, realignment of sectors, and a common function for strategic level ASM/ATFCM are expected to be implemented by 2014 in the Performance scenario (2015 in the Minimum scenario)
- Earlier benefit realisation for common procurement of basic training, foreseen to be implemented by 2013 (2015 in the Minimum scenario)

The cash flow per year and accumulated is shown below. The cumulative effect, showing the cash and net present value in each year, is displayed in the same graph. No break-even is expected by 2015.

¹³ Although it is assumed that the resources required for implementation exist in the current ANSP organisations and that no recruitment will be necessary, these resources represent a cost to implement NEFAB, and are as such included in the CBA calculations

Figure 7: 2012 – 2015 Performance scenario – cash and NPV per year and accumulated (1.000 EUR)



8 2020 MINIMUM SCENARIO

This section contains the cost benefit assessment for the Minimum scenario to 2020. The rationale for the Minimum scenario is that it should fulfil the minimum requirements for the establishment of a FAB, and as such it must be justified by its overall added value from a cost-benefit perspective, considering internal as well as external effects.

The Minimum scenario is characterised by harmonisation and cooperation, rather than integration. The expected internal financial implications until 2020 and onward are presented below.

8.1 Summary of internal financial effects

The 2020 Minimum scenario demonstrates a positive cash value of 3,0 MEUR but a negative net present value of -0,3 MEUR in the period 2012-2020. The total net present value describes the present value of cash flows incurred over a period of time – in this case in the period 2012-2020. The discount rate is 10%.

The cash flow in the longer period 2012-2030 amounts to 46,0 MEUR, corresponding to an discounted value of 11,0 MEUR. The projection from 2021 to 2030 is based on the assumption of a constant annual net benefit equal to the net benefit in 2020, expected to be realised each year after implementation of the 2020 Minimum Scenario is completed.

A cash based break-even point is estimated to occur in 2020. The internal financial implications of the 2020 Minimum scenario are summarised below.

Table 4: Summary internal financial implications in the 2020 and 2030 Minimum Scenario (MEUR)¹⁴

	2020 Minimum Scenario	2030 Minimum Scenario
Accumulated value of cash flow	3,0	46,0
Net Present Value (NPV)	-0,3	11,0
Estimated break-even point (payback time)	2021	2021

¹⁴ The net present value has been calculated using Discounted Cash Flow analysis with 2020+ as the terminal value

Throughout the analysis period, the Minimum scenario is characterised by relatively limited implementation costs as well as benefits. The lower costs can be explained by the emphasis on harmonisation rather than integration, as that is foreseen to drive less complexity in implementation. However, identified efficiency improvements from harmonisation are also relatively limited as it is difficult to realise benefits of scale.

The cash flow and the discounted cash flow per year attributed to each benefit and cost type, together with the cumulative effect, is demonstrated below.

The graph indicates break-even in the Minimum scenario in 2020.

Figure 8: 2012 – 2020 Minimum scenario – cash and NPV per year and accumulated (1.000 EUR)

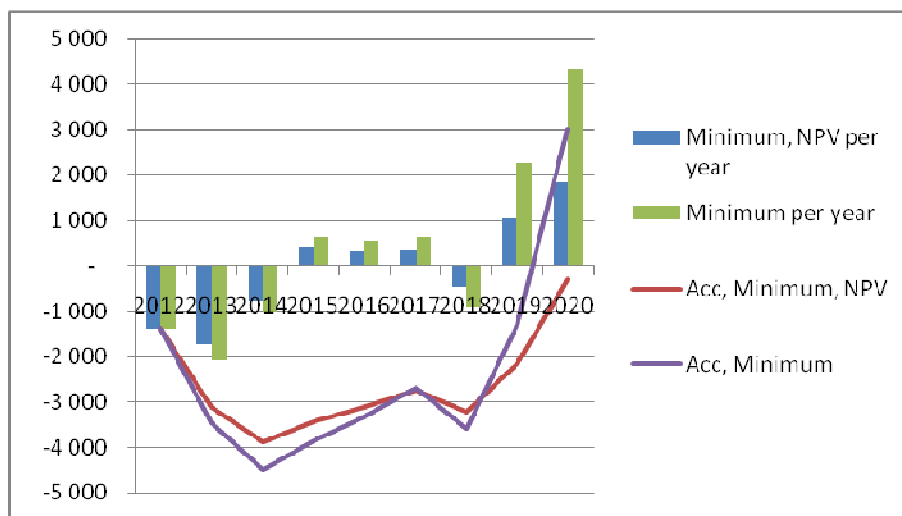
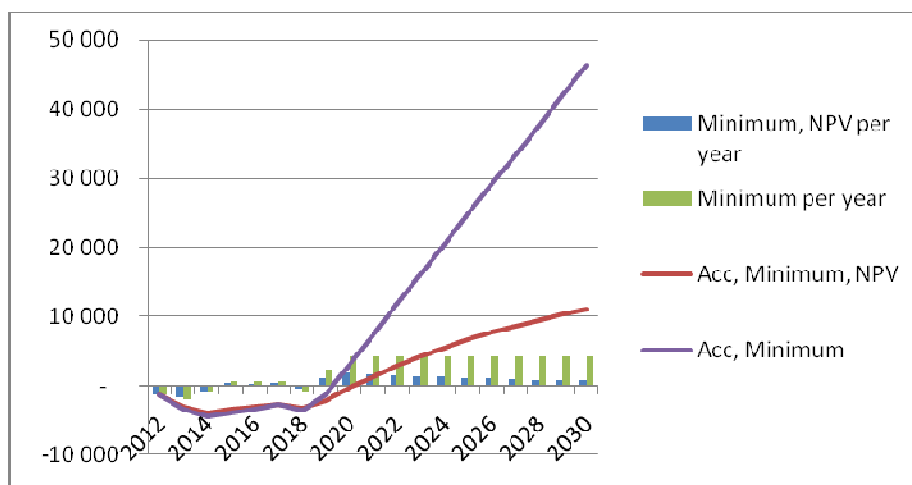


Figure 9: 2012 – 2030 Minimum scenario – cash and NPV per year and accumulated (1.000 EUR)



8.2 Internal financial effects per initiative

As mentioned in chapter 8, initial costs in the Minimum scenario are largely driven by airspace design activities and other cross border enablers. Key aspects of the scenario include:

- Harmonisation efforts to support cross border operations and extended free route applications.
- Implementation of remote supervision of CNS infrastructure, including necessary system investments
- Internal financial benefits from centralisation of operational support and systems functions.
- Benefits from joint procurement of basic training and MET services. This is the dominant benefit driver in the Minimum scenario

The net present value per initiative 2012-2020 are summarised in the table below.

Table 5: Minimum scenario, summary of net present value per initiative [1000 EUR]¹⁵

Area	Initiative	NPV of cash flow 2012-2020
Airspace Design	01 - ATS route structure and sectorisation	-1392
ATM	03 – Optimisation of ATS	840
	04 – Optimisation of ASM and ATFCM	-1069
Operational support	05a – Ancillary Services - ARO, Briefing & AIS/AIM	313
	05b – Ancillary Services – Procurement of MET	826
	06 - Harmonisation of Rules and Procedures	-1375
	07 – Optimisation of Training services	1759
Systems	08 – Supervision and monitoring of CNS infrastructure	-2065
	09 - Commonality of CNS/ATM systems	2147
	10 - Joint evaluation of technology within CNS & ATM	406
	11 - Common System Maintenance	660
	12 - Joint procurement (of systems)	-169
Safety	13 - Safety Management Systems	-1198
Summary 2012-2020, net present value:		-317

Airspace design and ATM

This area contains initiatives for ATS routes and sectorisation, ATS, ASM and ATFCM. In the Minimum scenario, reduction in route extensions is foreseen, which will produce external financial benefits through reduced flight times, reduced fuel burn and reduced emissions. These effects are evaluated in a separate socioeconomic analysis. Realignment of sectors for identified improvement areas also holds potential for increased sector productivity and more balanced workload, and is foreseen to result in a decrease in controller hours, corresponding to a reduced recruitment need compared to the baseline scenario.

¹⁵ Airspace design does not result in any internal financial benefits, as resulting benefits in terms of sector staffing is accounted for in IWP03 and IWP04. It is also a main driver for socioeconomic effects

Adopting NEFAB best practices for cross border military area planning and implementation is foreseen to reduce workload for Airspace design and ASM experts.

Implementation costs are foreseen from realignment of sectors and a subsequent need for training of ATCOs, implementation of modular training area management, and adoption of FAB-wide ASM and ATFCM principles, procedures and processes, enabling cross border operations. Costs also include the establishment of common coordinating functions.

In the Minimum scenario, most of these activities will have been performed before 2015, with the aim to fulfil the NEFAB 2015 Vision. A further development of the sectorisation and airspace modifications is foreseen until 2020, but within ATM the 2020 minimum scenario is viewed as "business as usual" after 2015, and no additional benefits or costs are foreseen.

Operational support functions

Operational support includes ancillary services, rules and procedures and training.

Harmonisation of operating rules and procedures and training content is seen as an important enabler for cross border operations in NEFAB. Hence costs will be incurred from coordination of operational procedures, including translation of operating handbooks, and harmonisation of basic training. However, there is also an identified benefit potential from centralisation of tasks, both within rules and procedures and training development, enabled by increasing harmonisation.

Common core content and common development of training plans is furthermore seen to create potential for combining training volumes, thereby creating benefits of scale. Joint procurement of basic training is expected to be a main benefit driver in the Minimum scenario, realised from 2015 and beyond.

Benefit potential has also been identified through centralisation of ARO and Briefing/AIS, resulting in cost reductions from reduced overhead, work according to best practice processes, elimination of duplicate functions and increased specialisation. Savings are also anticipated from common systems.

Cost reductions are also estimated to arise from common procurement of MET services in the NEFAB area. In the Minimum scenario, this is assumed to be realised in 2020 and onwards, as current limitations for cooperation, e.g. legally binding monopolies, are expected to require time to solve.

Systems

The system initiatives detail the potential for benefits within ATM/CNS system infrastructure. Common planning, evaluation and procurement work is covered by IWP09, IWP10 and IWP12, and IWP09 also includes savings potential in terms of investment level. Management and maintenance of systems is covered by IWP08 and IWP11.

Commonality of systems is a strong contributor to benefits until 2015, as relative quick wins have been identified for system implementations driven by SESAR that each ANSP will be required to invest in. Savings are identified through common implementation of SUR technology, enhanced data link, AMHS and NET. Benefits are also identified from reduction of radar over-coverage in the NEFAB area and sharing of procurement specifications.

It is foreseen that opportunities for commonality will continue to be identified over time, and that cooperation may take place on bilateral, trilateral or NEFAB-wide basis. However, these financial benefits have not been evaluated, because no reliable estimates have been possible to make regarding the benefits from common system volumes.

Potential benefits from common planning and procurement of systems, as described in IWP 10 and 12 respectively, are closely interdependent to the commonality of systems initiative. They describe different parts of the same investment process and are assumed to be implemented together.

There is also a resulting potential for reduced workload within maintenance, from establishment of common level 2 maintenance for these systems.

For supervision of CNS infrastructure, the possibility for remote operations during night time and weekends has been evaluated in the Minimum scenario. This will require new system functionality and will drive significant system investment costs 2018-2020, but is seen to have the potential to significantly improve utilisation of technical supervisors, providing annual net savings after 2020.

Safety Management Systems

While harmonisation of safety management systems is primarily an enabler for NEFAB operations, benefit potential is also created through the harmonisation activities. Until 2015, harmonisation work and alignment of processes will be conducted, so that requirements are fulfilled for NEFAB to be operational, and in order to meet performance requirements at FAB level.

Benefits in the Minimum scenario are anticipated to stem from joint implementation of a software tool for occurrence reporting and investigation, and more efficient ways of working according to harmonised and aligned processes. This benefit potential is foreseen to partly off-set the annual cost increase due to NEFAB operations

8.3 Distribution of cash flow per IWP over time

The negative cash flows particularly in the beginning of the period in several of the IWPs in the Minimum scenario are mainly due to staff costs to conduct development and implementation work. These costs are expected to be highest in 2012-2013 but are gradually reduced, and are considerably smaller in the period 2016-2020.

While initial savings are predominantly within technology, as identified common investments within CNS are gradually realised, the FTE category is expected to generate increasing net savings throughout the period 2015-2020.

Annual savings are also projected for ARO, briefing and AIS/AIM systems from 2020 and beyond. System implementation costs, on the other hand, are anticipated to increase in the years 2018-2020, mainly attributable to investment costs to enable remote supervision of CNS infrastructure.

Procurement of training will continue to generate benefits after 2015, while MET is expected to increase benefits for procured services further from 2020 and onwards.

The cash flow and discounted cash flow per IWP for the Minimum scenario is shown underneath:

Figure 10: Minimum scenario, IWP 1, ATS route structure and sectorisation: Cash and NPV per year and accumulated (1.000 EUR)

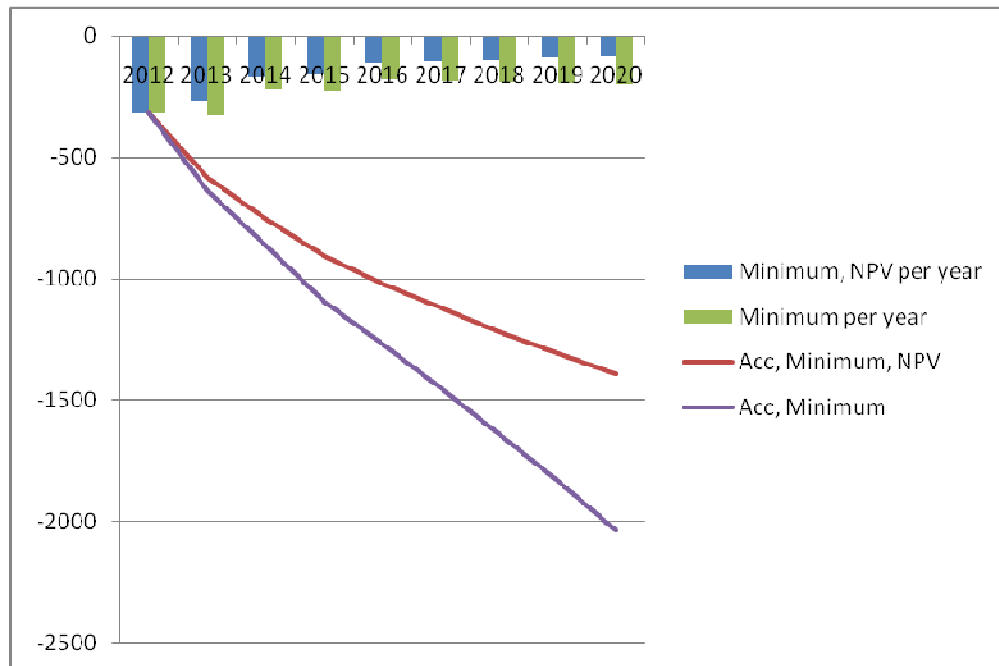


Figure 11: Minimum scenario, IWP 3, Optimisation of ATS: Cash and NPV per year and accumulated (1.000 EUR)

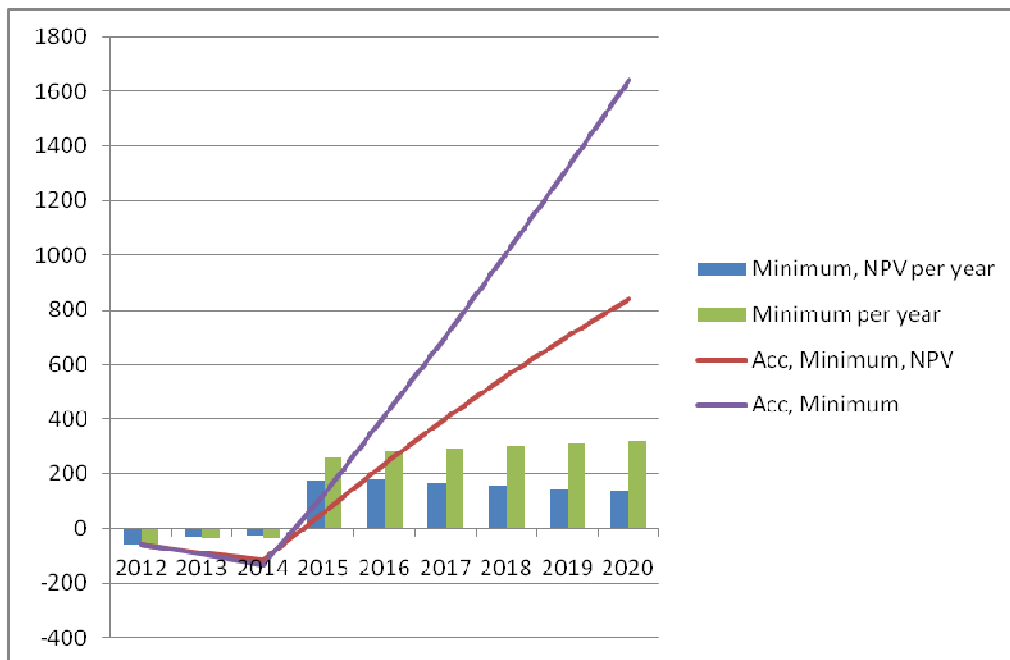


Figure 12: Minimum scenario, IWP 4, Optimisation of ASM and ATFCM: Cash and NPV per year and accumulated (1.000 EUR)

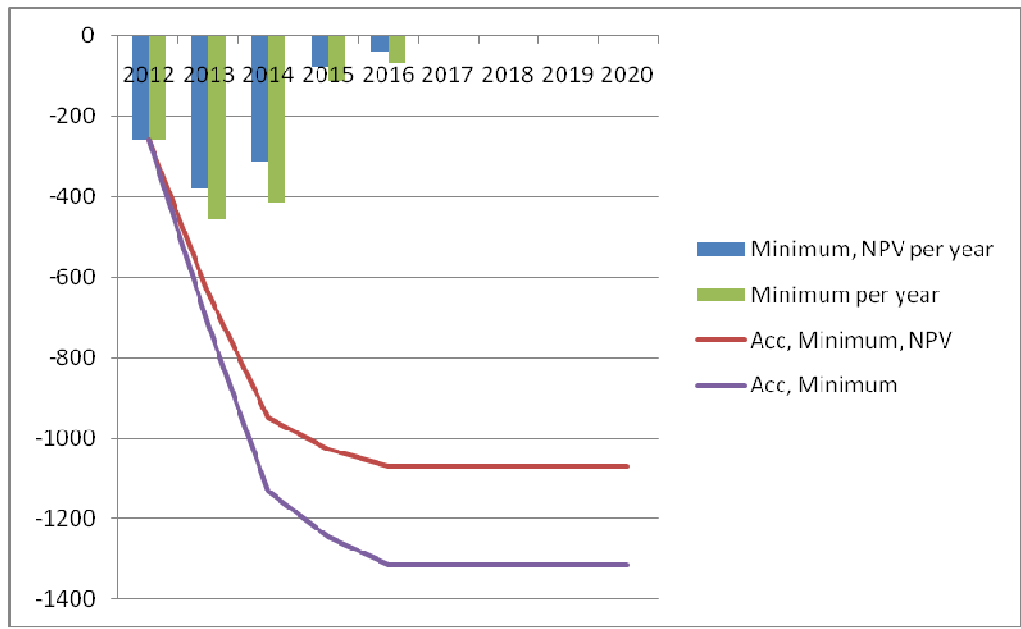


Figure 13: Minimum scenario, IWP 5a, Ancillary Services - ARO, Briefing & AIS/AIM: Cash and NPV per year and accumulated (1.000 EUR)

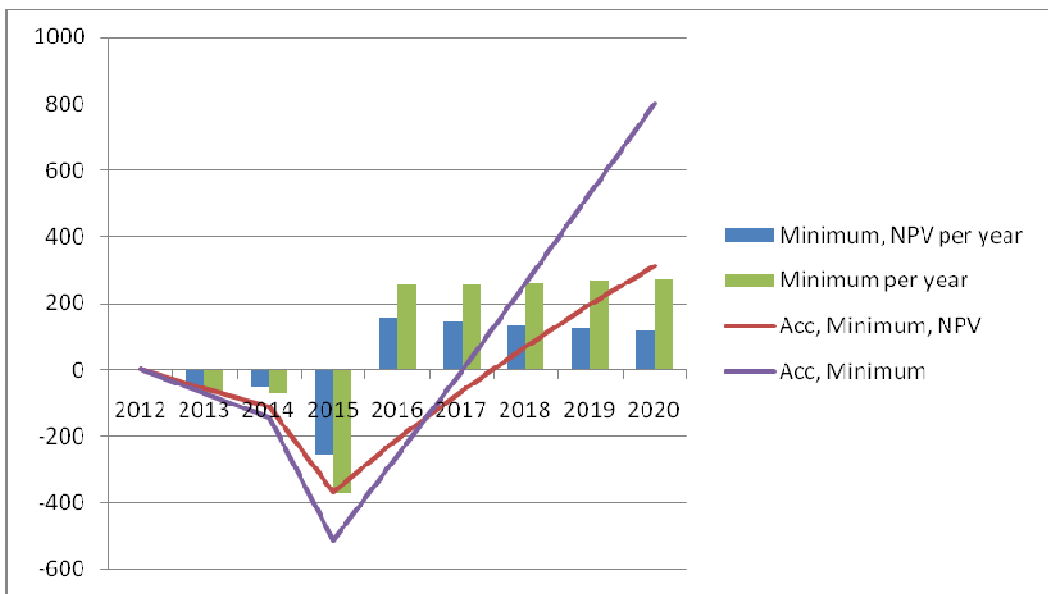


Figure 14: Minimum scenario, IWP 5b, Ancillary Services – Procurement of MET: Cash and NPV per year and accumulated (1.000 EUR)

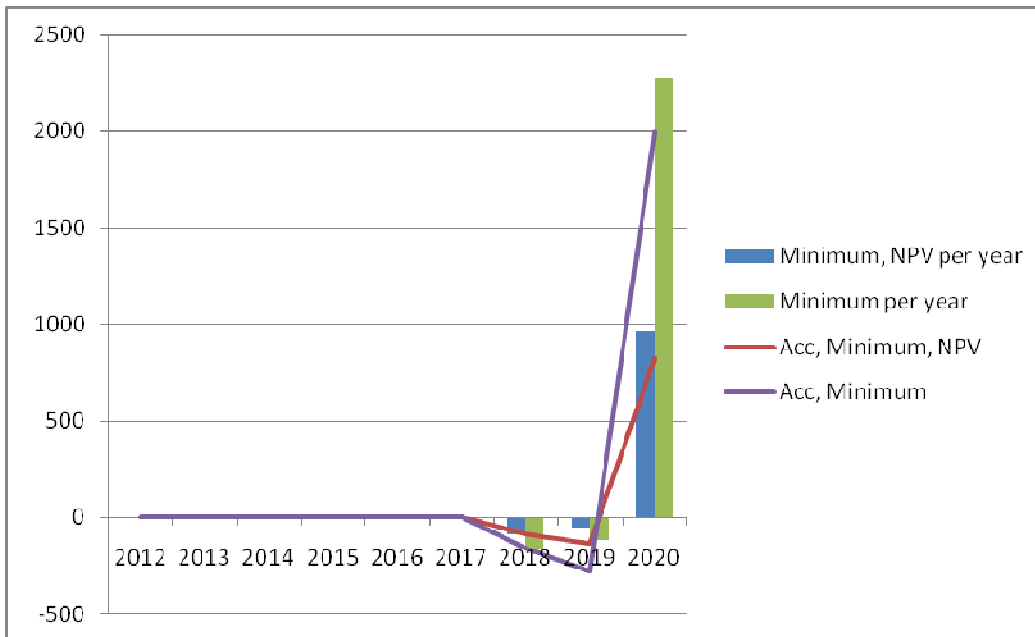


Figure 15: Minimum scenario, IWP 6, Harmonisation of Rules and Procedures: Cash and NPV per year and accumulated (1.000 EUR)

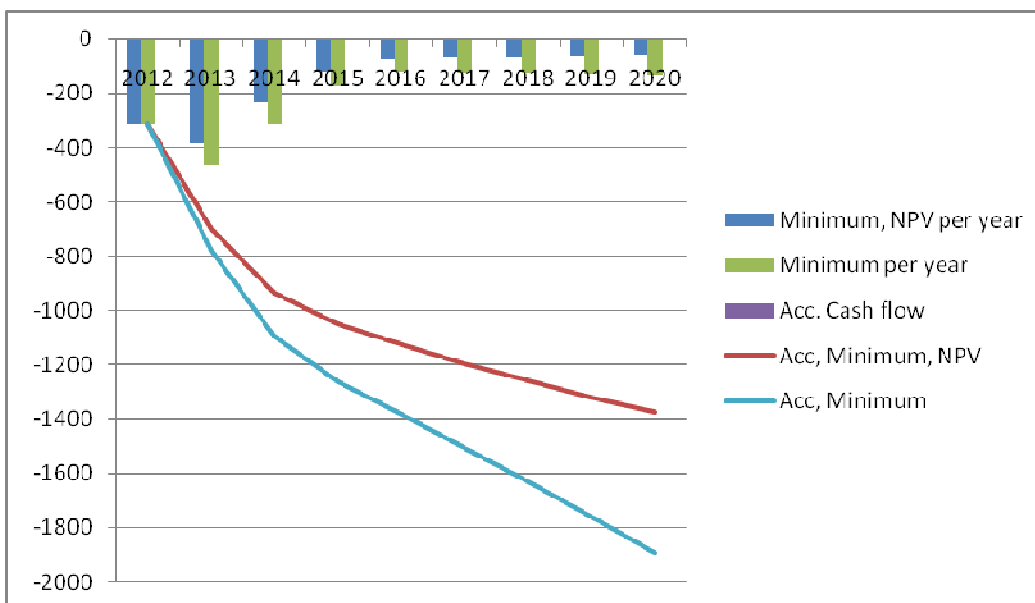


Figure 16: Minimum scenario, IWP 7, Optimisation of Training services: Cash and NPV per year and accumulated (1.000 EUR)

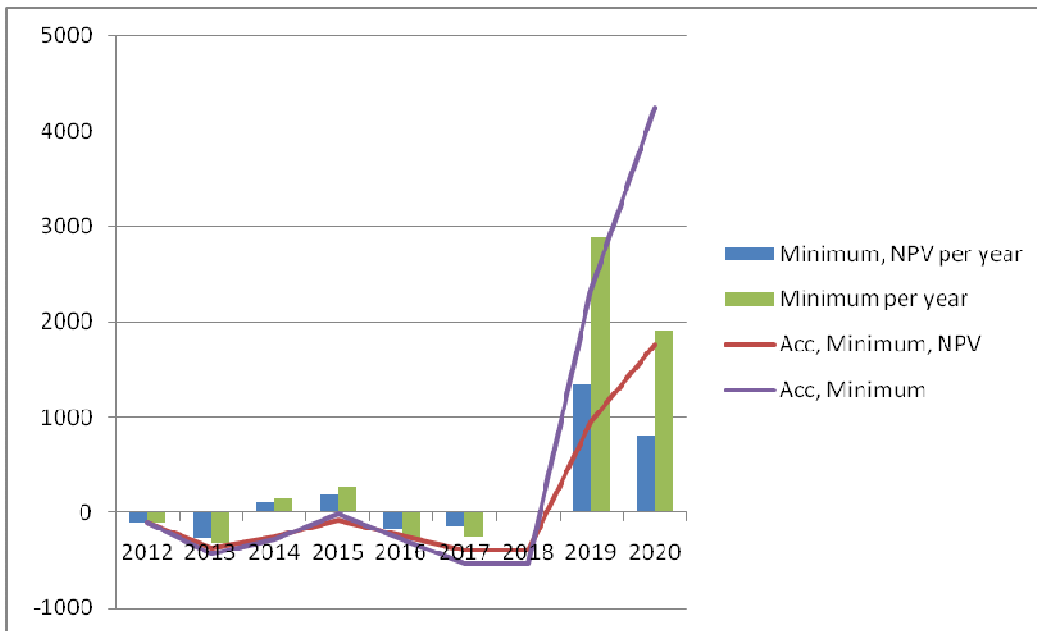


Figure 17: Minimum scenario, IWP 8, Supervision and monitoring of CNS infrastructure: Cash and NPV per year and accumulated (1.000 EUR)

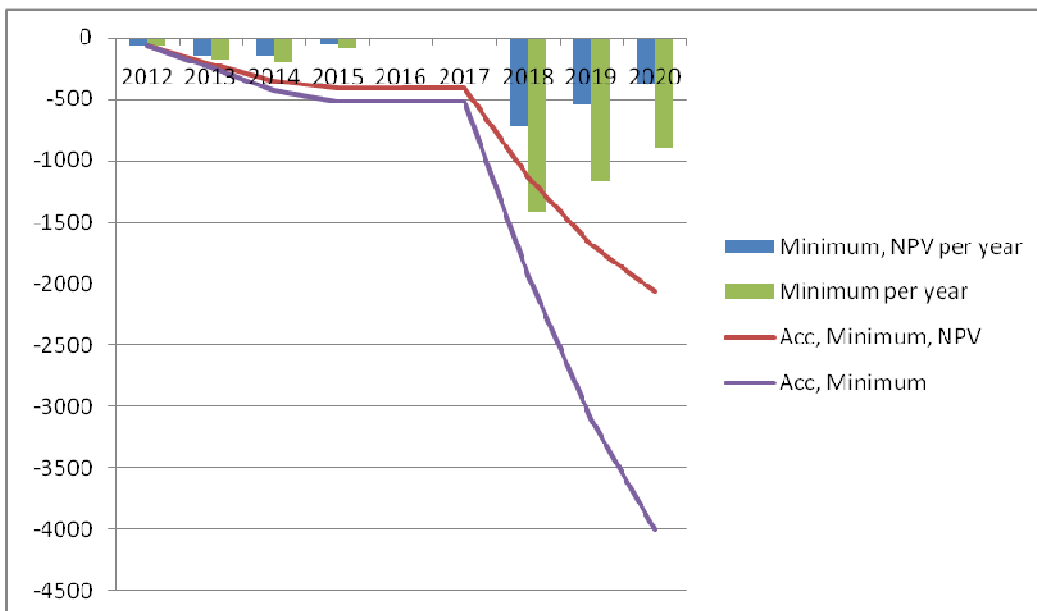


Figure 18: Minimum scenario, IWP 9, Commonality of CNS/ATM systems: Cash and NPV per year and accumulated (1.000 EUR)

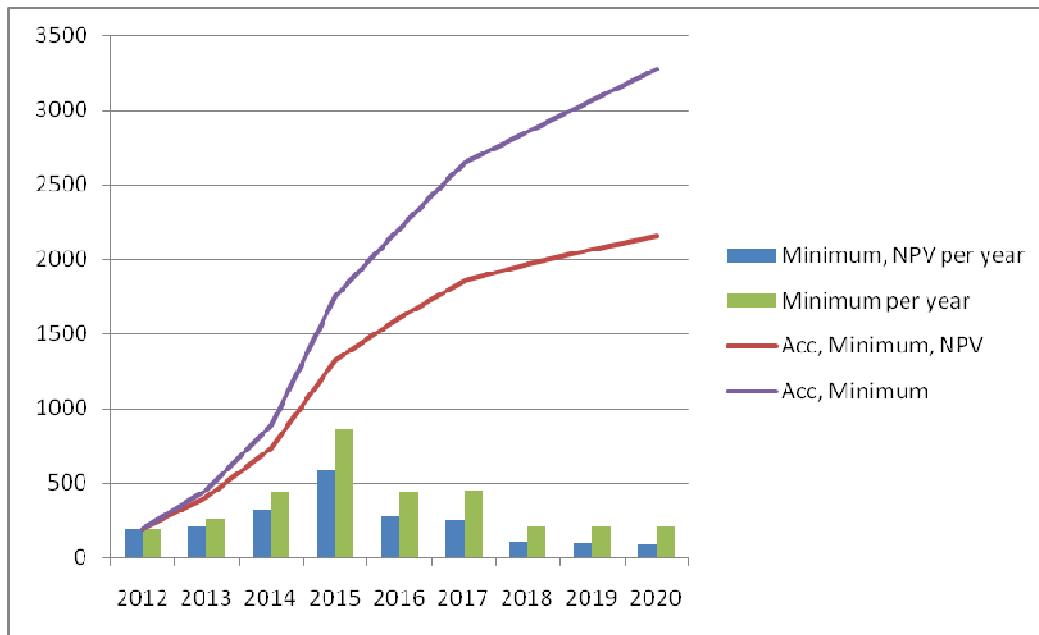


Figure 19: Minimum scenario, IWP 10, Joint evaluation of technology within CNS and ATM: Cash and NPV per year and accumulated (1.000 EUR)

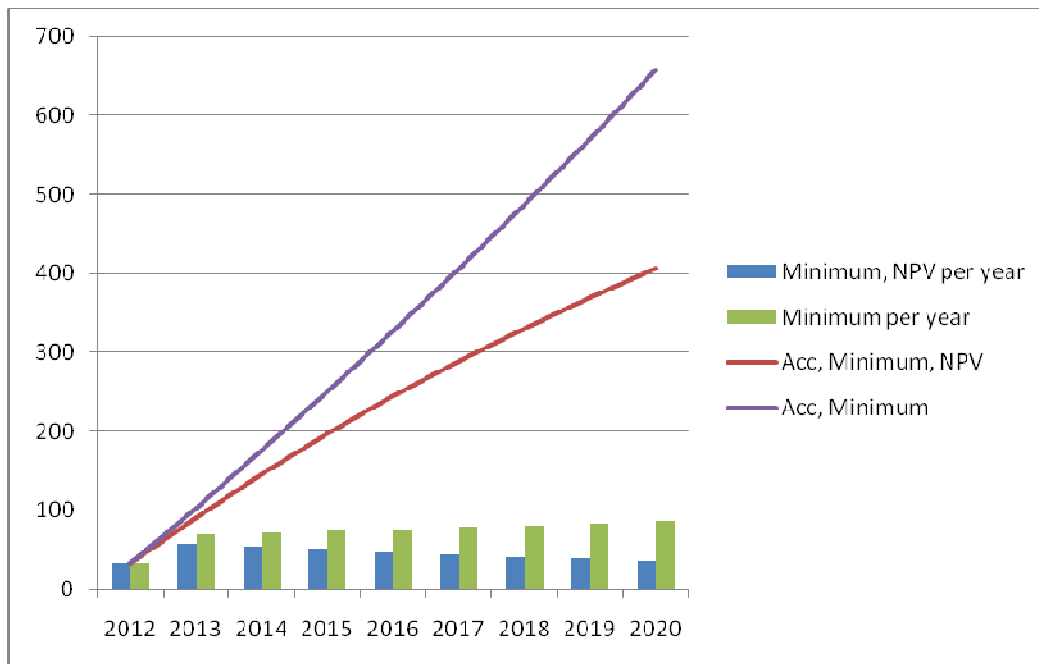


Figure 20: Minimum scenario, IWP11, Common System Maintenance: Cash and NPV per year and accumulated (1.000 EUR)

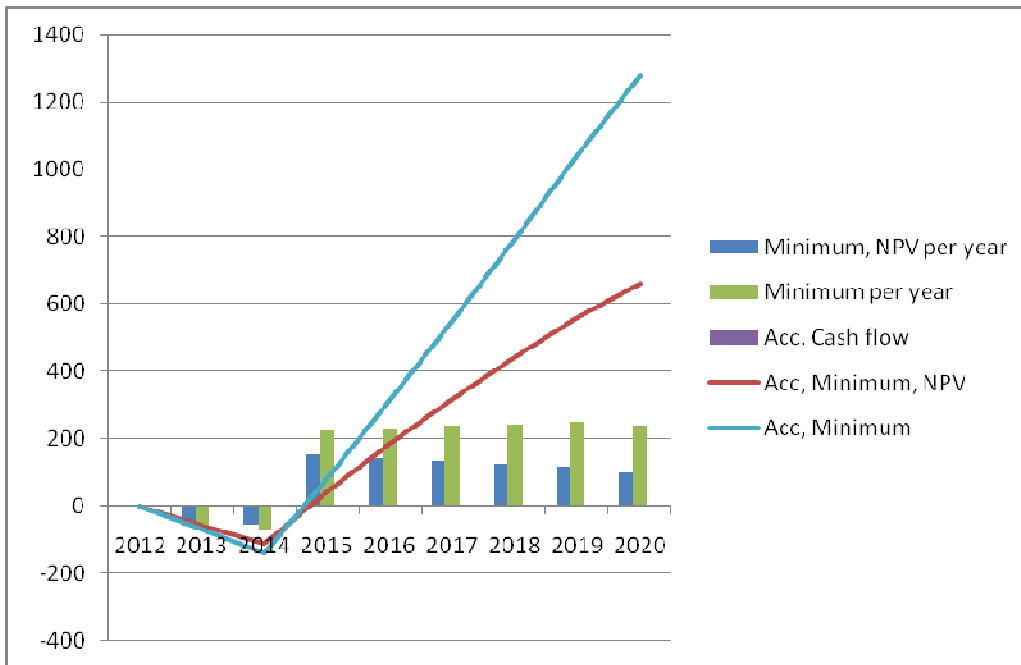


Figure 21: Minimum scenario, IWP 12, Joint procurement of systems: Cash and NPV per year and accumulated (1.000 EUR)

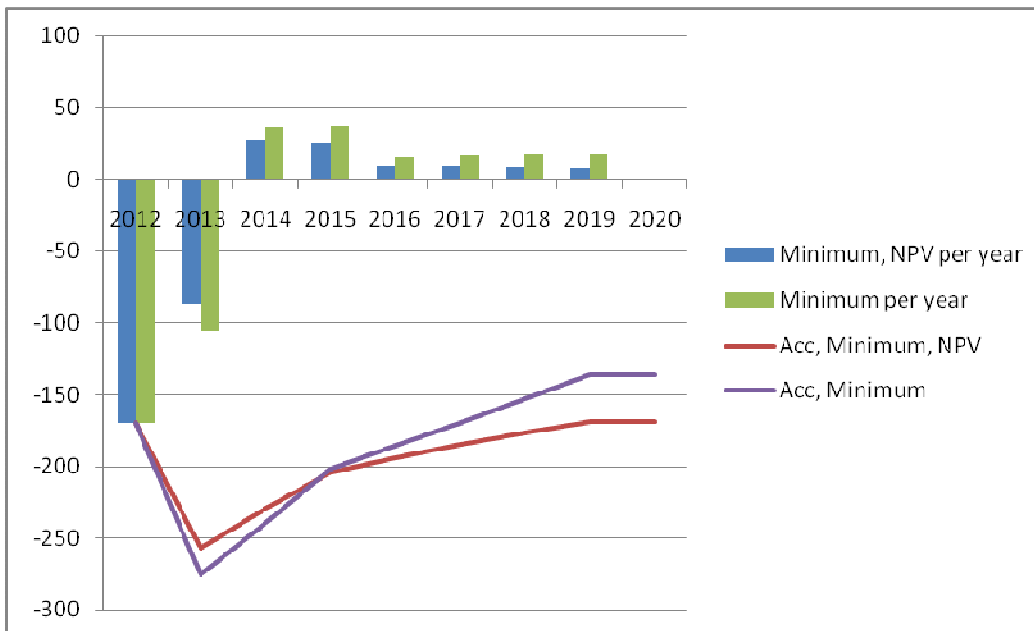
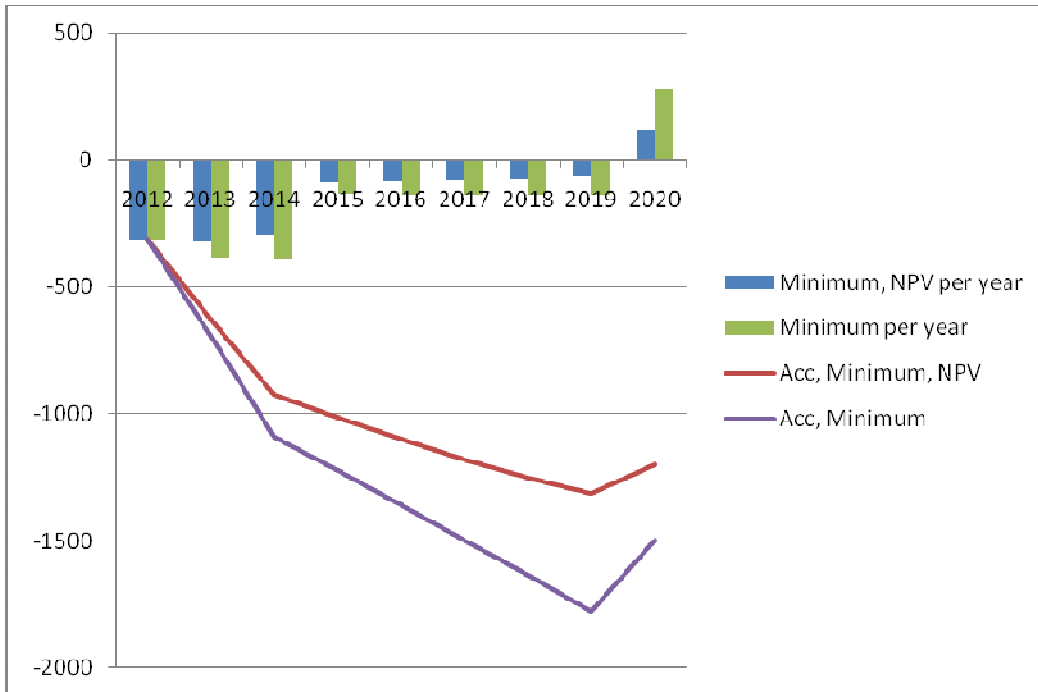


Figure 22: Minimum scenario, IWP 13, Safety Management Systems: Cash and NPV per year and accumulated (1.000 EUR)



9 2020 PERFORMANCE SCENARIO

This section contains the cost benefit assessment for the Performance scenario, i.e. the scenario designed to describe the most ambitious achievable scenario for NEFAB 2020.

The Performance scenario is characterised by a higher ambition level and more aggressive time line for implementation than the Minimum scenario, and thereby a higher inherent implementation risk,. The scenario is characterised by more proactive cooperation and a higher degree of integration and centralisation of tasks. The expected internal financial implications until 2020 and onward are presented below.

9.1 Summary of internal financial effects

The Performance scenario demonstrates a positive overall cash flow 2011-2020, with significantly higher benefits than in the Minimum scenario. The cash value of savings 2011-2020 are estimated at approximately 42,6 MEUR, which is significantly more than identified in the Minimum scenario (3,0 MEUR).

The total net present value, which describes the present value of cash flows incurred in the period 2011-2020 is also significantly higher, estimated at 18,9 MEUR compared to -0,3 MEUR in the Minimum scenario.

The discounted cash flow from 2012-2030 amounts to 51,8 MEUR, compared to 11,0 MEUR in the Minimum scenario.

A break-even in the Performance scenario is expected in 2017. The financial implications of the 2020 Performance scenario are summarised below.

Table 6: Summary internal financial implications in the 2020 and 2030 Performance Scenario¹⁶

	2020 Performance Scenario	2030 Performance Scenario
Accumulated value of cash flow	42,6	168,7
Net Present Value (NPV)	18,9	51,8
Estimated break-even point (payback time)	2017	2017

¹⁶ The net present value has been calculated using Discounted Cash Flow analysis with 2020+ as the terminal value. A 10% discount rate and growth corresponding to average NEFAB inflation have been used.

The discounted cash flow per year, together with the cumulative effect, is demonstrated below. The graph indicates that break-even will be reached just after 2017.

While the Performance scenario does not have a significantly earlier break-even point than the Minimum scenario, the overall benefit potential is substantially higher.

Figure 23: 2012 – 2020 Performance scenario – cash and NPV per year and accumulated (1.000 EUR)

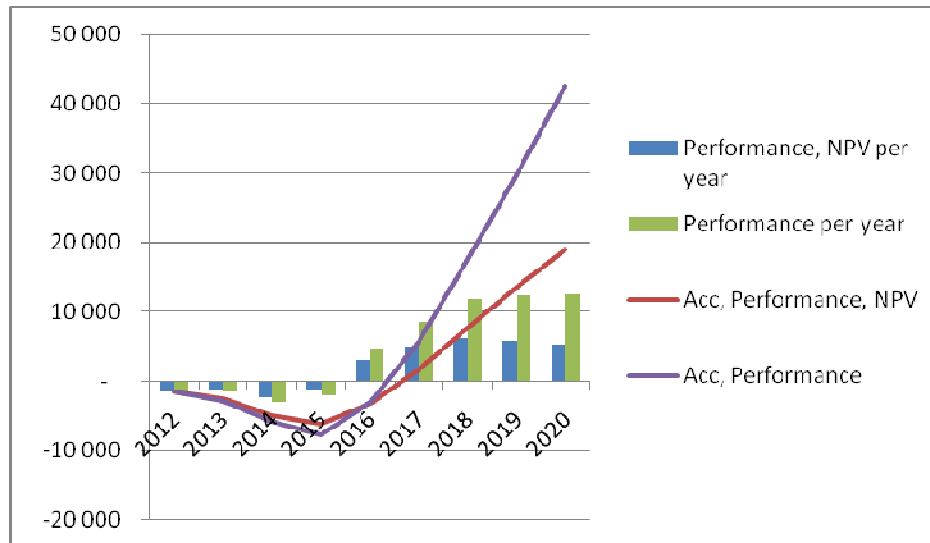
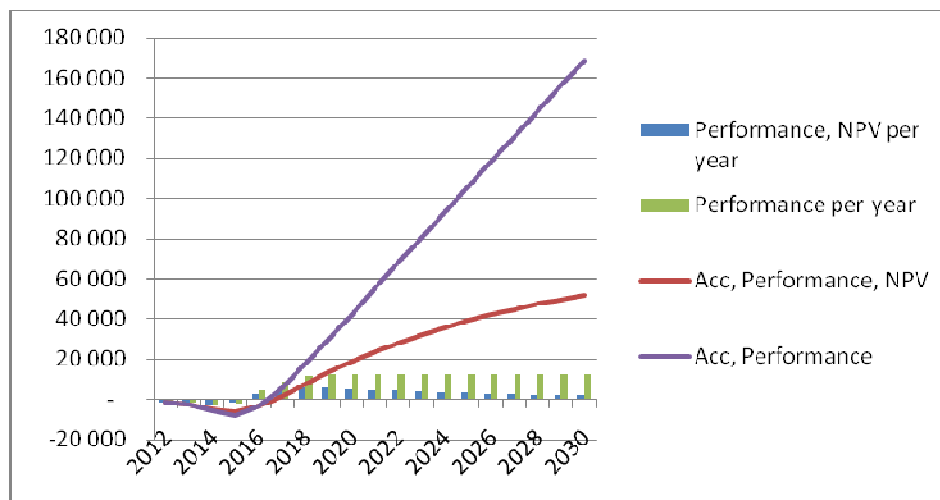


Figure 24: 2012 – 2030 Performance scenario – cash and NPV per year and accumulated (1.000 EUR)



9.2 Internal financial effects per initiative

A main driver for benefits in the Performance scenario is more efficient use of manpower from integration of staff functions. This is expected to result in cost reductions from reduced overhead, work according to best practice processes, elimination of duplicate functions and increased specialisation.

A higher degree of centralisation and integration is foreseen compared to the Minimum scenario, for example within ASM and ATFCM, ancillary services, training, rules and procedures, technical supervision of CNS infrastructure and safety management. Savings are also foreseen as further airspace improvements create an environment for increasing ATCO productivity and a more efficient use of human resources.

The more ambitious time line in the Performance Scenario also contributes positively, as benefits are foreseen to be realised earlier.

Although savings from common systems investments is expected to be higher in the Performance compared to the Minimum scenario, the total potential related to investment level remains to be quantified.

Net present value per initiative 2011-2020 are summarised in the table below.

Table 7: Summary of (internal) net present value per initiative [1000 EUR]¹⁷

Area	Initiative	NPV of cash flow 2011-2020
Airspace Design	01 - ATS route structure and sectorisation	-2.665
ATM	03 - Optimisation of ATS	-7.299
	04 - Optimisation of ASM and ATFCM	-85
Operational support	05a – Ancillary Services - ARO, Briefing & AIS/AIM	9.747
	05b – Ancillary Services – Procurement of MET	5.716
	06 – Harmonisation of Rules and Procedures	2.360
	07 - Optimisation of Training services	6.523
Systems	08 - Supervision and monitoring of CNS infrastructure	-2.905
	09 - Commonality of CNS/ATM systems	1302
	10 - Joint evaluation of technology within CNS & ATM	534
	11 - Common System Maintenance	4.882
	12 - Joint procurement (of systems)	73
Safety	13 - Safety Management Systems	732
Summary 2020 Performance Scenario, net present value		18.913

¹⁷ Airspace design does not result in any internal financial benefits, as resulting benefits in terms of sector staffing is accounted for in IWP03 and IWP04. It is also a main driver for socioeconomic effects

Airspace design and ATM

This area contains initiatives for ATS routes and sectorisation, ATS, ASM and ATFCM. To fulfil the NEFAB 2015 Vision, a reduction in route extensions is foreseen. Additional work will take place in the Performance scenario, to design flexible cross border sectors and Terminal Airspace Systems, and for FRA implementation. This will drive additional costs and complexity compared to the 2015 milestone, but will also create additional external benefit potential, which is captured in the socioeconomic analysis.

The airspace improvements in the Performance scenario will furthermore create a potential for better use of human resources, and the ATS initiative is a key contributor to the CBA. This implies that a foreseen capacity increase can be managed with a relatively lower increase of ATCOs, thereby reducing the future recruitment need.

Within ASM and ATFCM, the Performance scenario will drive implementation costs through work with extended CDM processes, development of a modular training area concept, and procedures for free route airspace and dynamic TMA management. Better utilisation of manpower is foreseen on a strategic, pre-tactical and tactical level, through the implementation of a regional network management unit. A strategic common ASM/ATFCM function is foreseen by 2014, followed by centralised pre-tactical and tactical functions by 2017. As the risk related to tactical centralised functions by 2017 is considered high, this will need clarification with military users from a national security perspective.

Operational support functions

Operational support includes ancillary services, rules and procedures and training. In the Performance scenario, the main benefit potential within operational support will come from integration of functions.

Centralisation into a common physical unit is foreseen both for development of training plans and operational rules and procedures. The benefit potential is higher than in the Minimum scenario, as a larger share of the training content and operational rules and procedures is common, reducing the overall workload.

Benefits are also expected to be higher in the Performance than in the Minimum scenario from centralisation of ARO and Briefing/AIS. This is because a physically rather than a virtually centralised function is foreseen, creating further potential to reduce overhead, eliminate duplicate functions and increase specialisation. In the performance scenario, FTE reductions are also foreseen from a common production unit for AIP, creating savings in processing, packaging & distribution, as well as for common data management.

Just like in the Minimum scenario, potential cost reductions are expected from common procurement of MET and training services in the NEFAB area.

Overall, benefits throughout the analysis period are estimated to be higher, mainly due to earlier benefit realisation in the Performance scenario.

Systems

The system initiatives detail the potential for benefits within ATM/CNS system infrastructure. Common planning, evaluation and procurement is covered by IWP09, IWP10 and IWP12, and IWP09 also includes savings potential in terms of investment level. Management and maintenance of systems is covered by IWP08 and IWP11.

Just as in the Minimum scenario, commonality of systems is a contributor to benefits until 2015, as relative quick wins have been identified for system implementations driven by SESAR that each ANSP will be required to invest in. Benefits are also identified from reduction of radar over-coverage in the NEFAB area and sharing of procurement specifications.

Commonality of systems is expected to increase over time in the Performance scenario, and opportunities for commonality are assumed to be maximised through the development and implementation of a common NEFAB replacement plan.

However, the financial benefits related to this have not been evaluated, as it has not yet been evaluated which systems hold the potential, or what the forms of cooperation could be. The benefits for systems IWP09-12 are thereby similar to the estimates in the Minimum scenario, even though the Performance scenario is seen to generate higher benefits in the long term. Further investigation is required to identify the potential from common system investments

However, substantial benefits are foreseen in the Performance scenario from remote supervision of CNS infrastructure, resulting in a potential for more cost efficient and flexible utilisation of the total ATM systems and for technical supervision across NEFAB. While system investments will be necessary, the effects are foreseen to have significant potential to reduce the need for technical supervisors.

Safety Management Systems

Safety management is an important enabler for NEFAB and harmonisation work and alignment of processes will be conducted, so that operational requirements are fulfilled for NEFAB, and in order to meet performance requirements at FAB level.

In the Performance scenario, it is assumed that one common Safety Management System will be implemented in NEFAB. The common implementation of a software tool for occurrence reporting and investigation is foreseen to enable savings compared to a no-FAB scenario. Furthermore, a centralised function is foreseen to create potential to allow for more efficient ways of working through aligned processes, reduced duplication of tasks and sharing of best practices. It is foreseen that the initiative will be implemented in 2014.

9.3 Distribution of cash flow per IWP over time

The performance scenario has higher implementation costs than the Minimum scenario, in particular in the period between 2014-2017. The reason for this is that the 2020 Performance scenario is foreseen to be more complex and costly to implement, and that it has a more aggressive time line for benefit realisation. The vast majority are foreseen to be implemented by 2017, whereas much of the implementation takes place toward the end of the implementation period in the Minimum scenario. In the period 2018-2020 the Minimum scenario is therefore expected to have higher implementation costs than the Performance scenario.

Negative cash flows especially in the beginning of the period are mainly due to staff costs to conduct development and implementation work. There are also additional systems implementation costs compared to the Minimum scenario, due to operational requirements within ATS on functionality to enable dynamic sector management.

However, the benefits are also expected to be significantly larger. Additional benefit potential is mainly driven by FTE reductions, as a result of cross border activities, more ambitious centralisation and integration efforts. The FTE savings are in particular driven by ATM, operational support functions and through remote supervision of CNS infrastructure. Benefits within procured services are also expected to be higher than in the Minimum scenario.

The discounted cash flow per year attributed to each IWP is demonstrated overleaf. Some of the initiatives show a negative development through the entire period and it would be tempting not to carry out these initiatives. However, as mentioned before the 13 initiatives are closely integrated and support each other and should be seen as a total package rather than individual initiatives. However, the individual financial development shown in the following charts may provide a basis for review of some the initiatives in order to improve the financial performance.

Figure 25: Performance scenario, IWP 1, ATS route structure and sectorisation: Cash and NPV per year and accumulated (1.000 EUR)

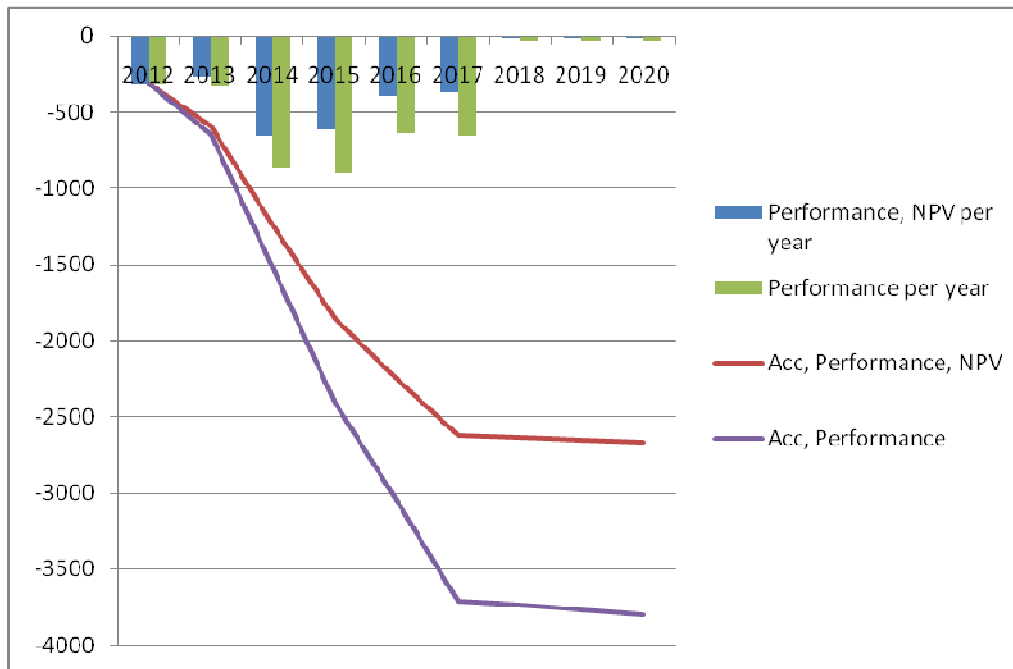
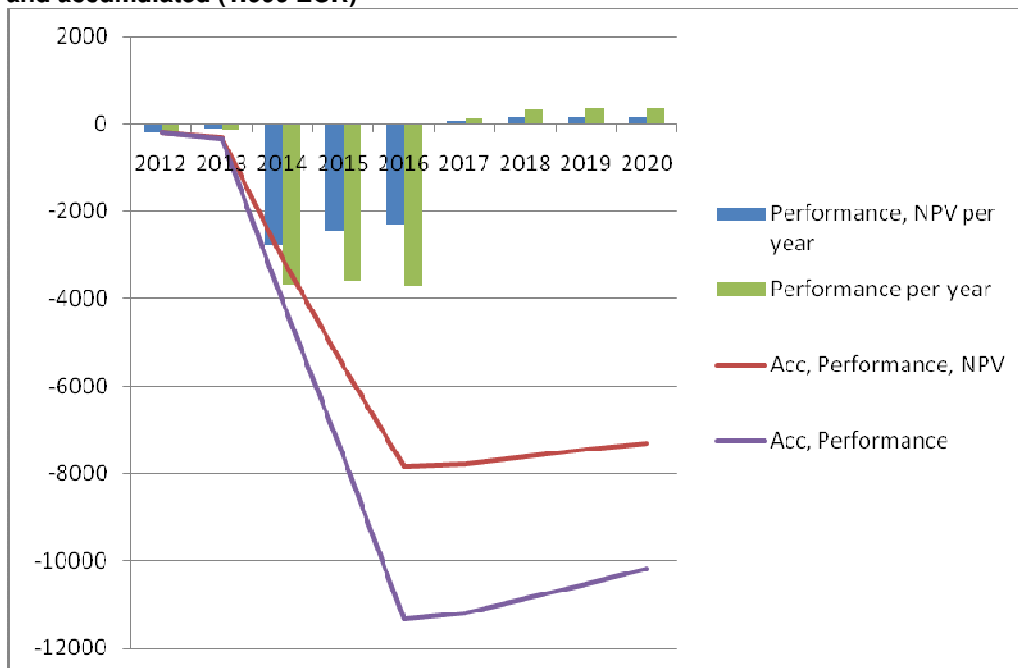


Figure 26: Performance scenario, IWP 3, Optimisation of ATS: Cash and NPV per year and accumulated (1.000 EUR)¹⁸



¹⁸ This initiative is an enabler for other initiatives, hence does not give benefits by it self



Figure 27: Performance scenario, IWP 4, Optimisation of ASM and ATFCM: Cash and NPV per year and accumulated (1.000 EUR)

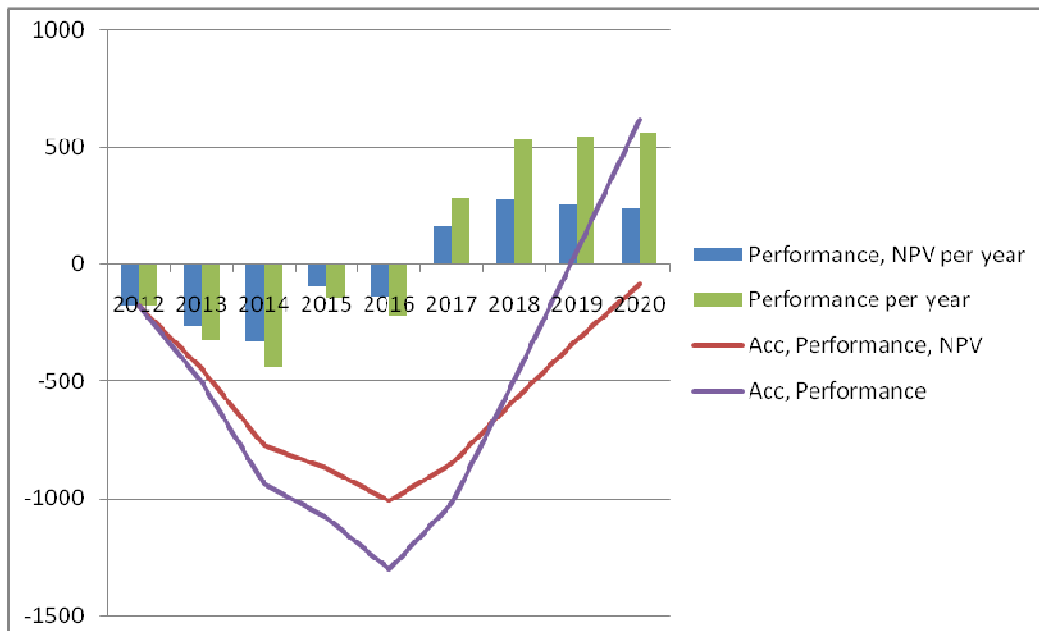


Figure 28: Performance scenario, IWP 5a, Ancillary Services - ARO, Briefing & AIS/AIM: Cash and NPV per year and accumulated (1.000 EUR)

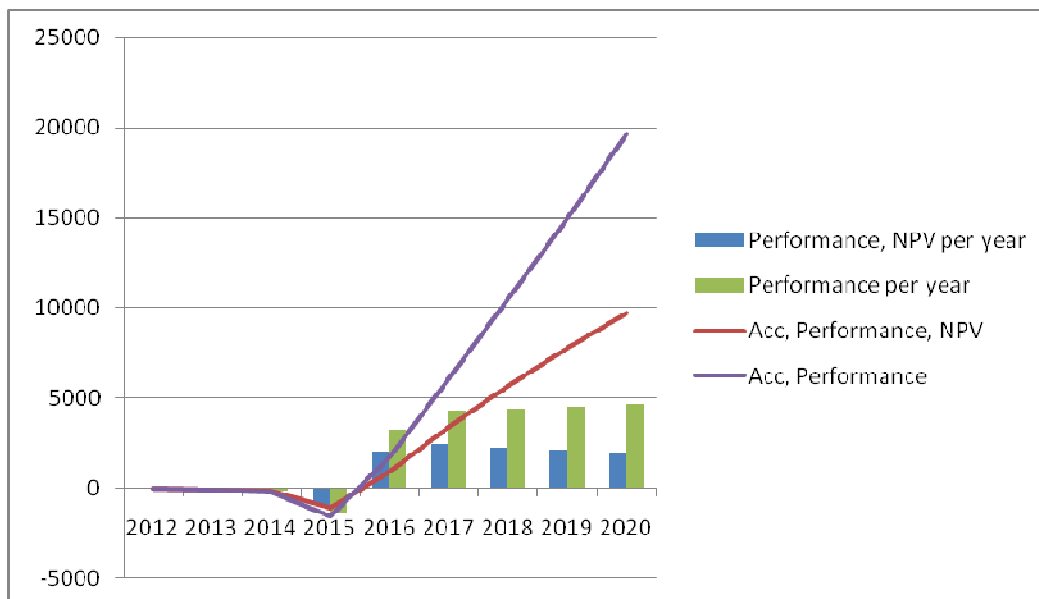


Figure 29: Performance scenario, IWP 5b, Ancillary Services – Procurement of MET: Cash and NPV per year and accumulated (1.000 EUR)

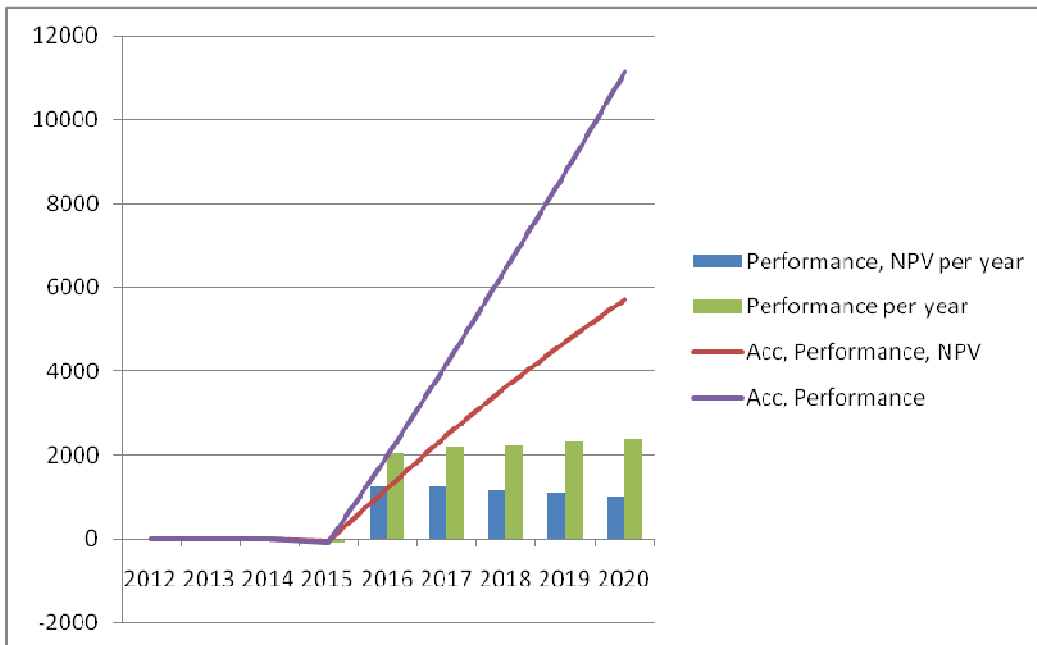


Figure 30: Performance scenario, IWP 6, Harmonisation of Rules and Procedures: Cash and NPV per year and accumulated (1.000 EUR)

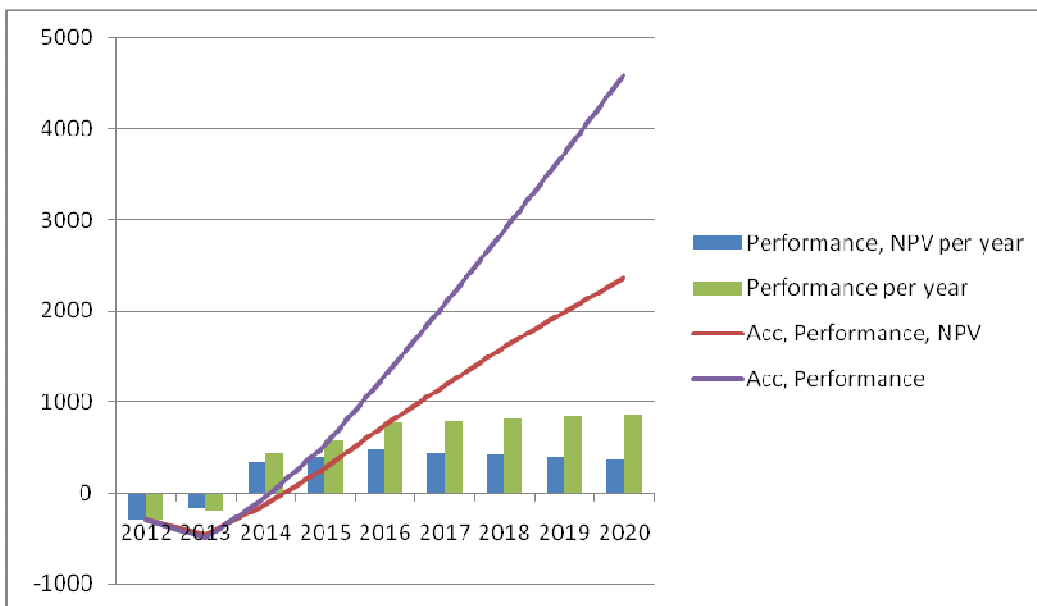


Figure 31: Performance scenario, IWP 7, Optimisation of Training services: Cash and NPV per year and accumulated (1.000 EUR)

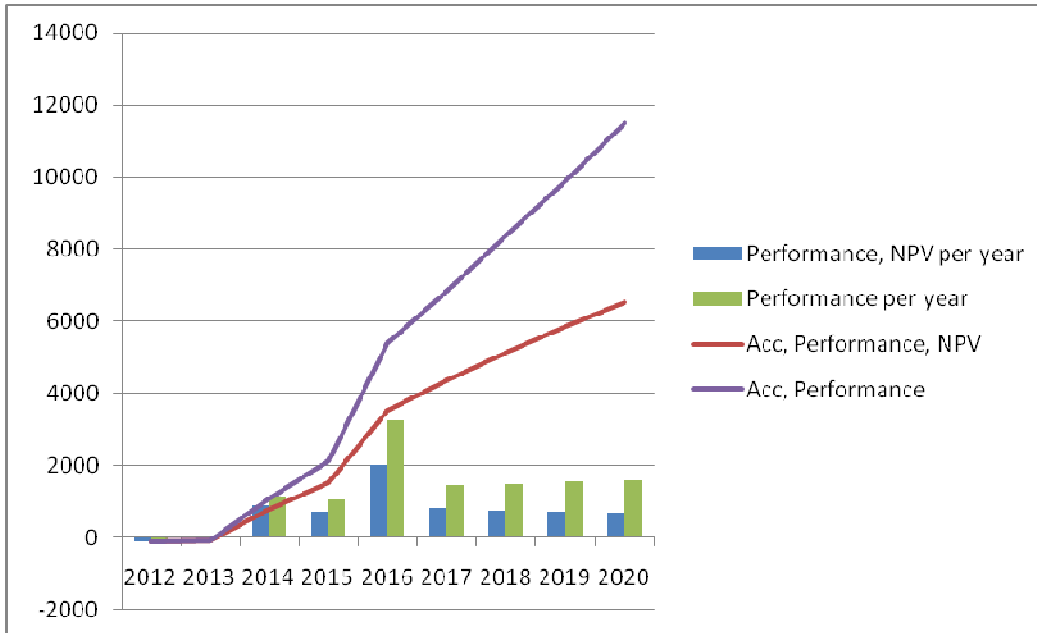


Figure 32: Performance scenario, IWP 8, Supervision and monitoring of CNS infrastructure: Cash and NPV per year and accumulated (1.000 EUR)

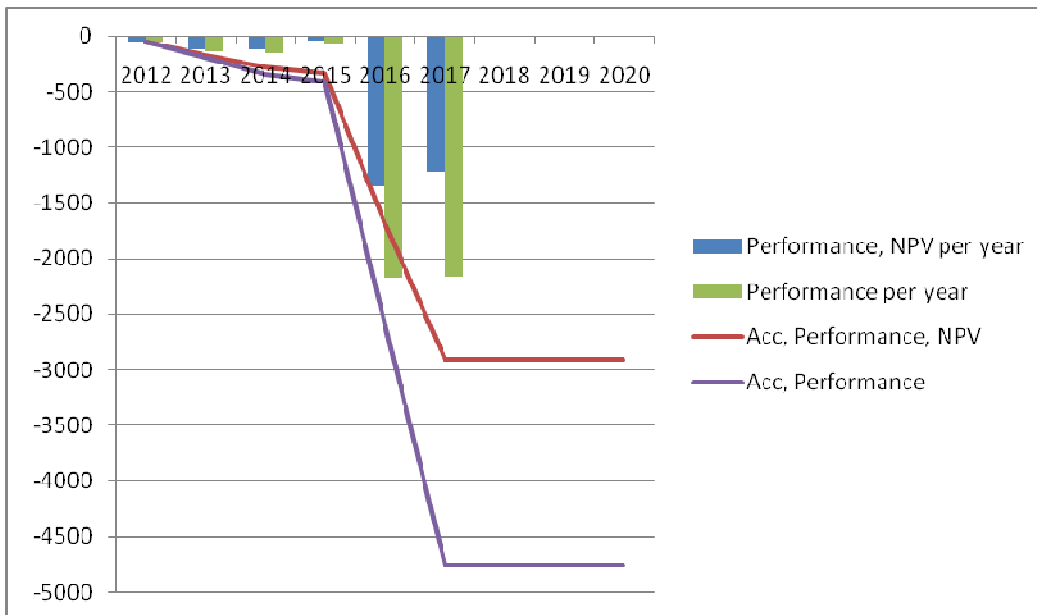


Figure 33: Performance scenario, IWP 9, Commonality of CNS/ATM systems: Cash and NPV per year and accumulated (1.000 EUR)

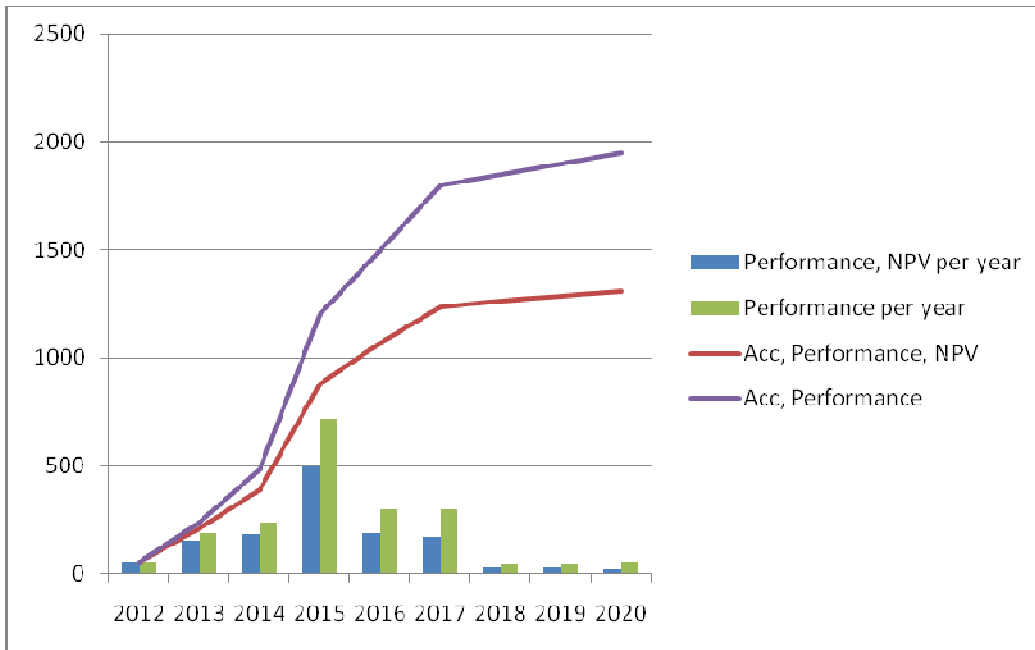


Figure 34: Performance scenario, IWP 10, Joint evaluation of technology within CNS and ATM: Cash and NPV per year and accumulated (1.000 EUR)

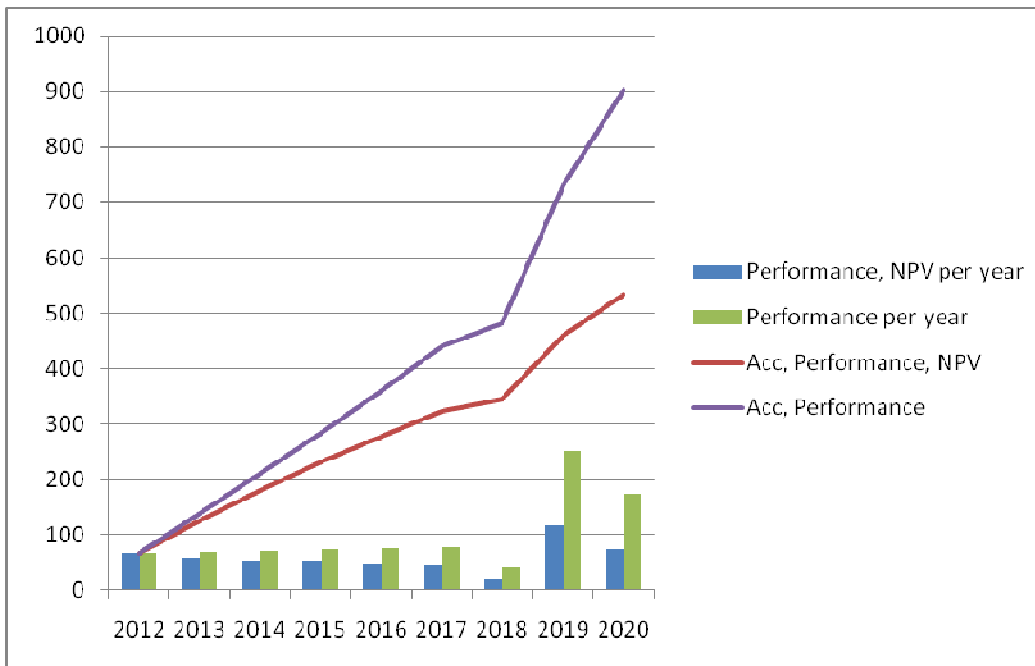


Figure 35: Performance scenario, IWP11, Common System Maintenance: Cash and NPV per year and accumulated (1.000 EUR)

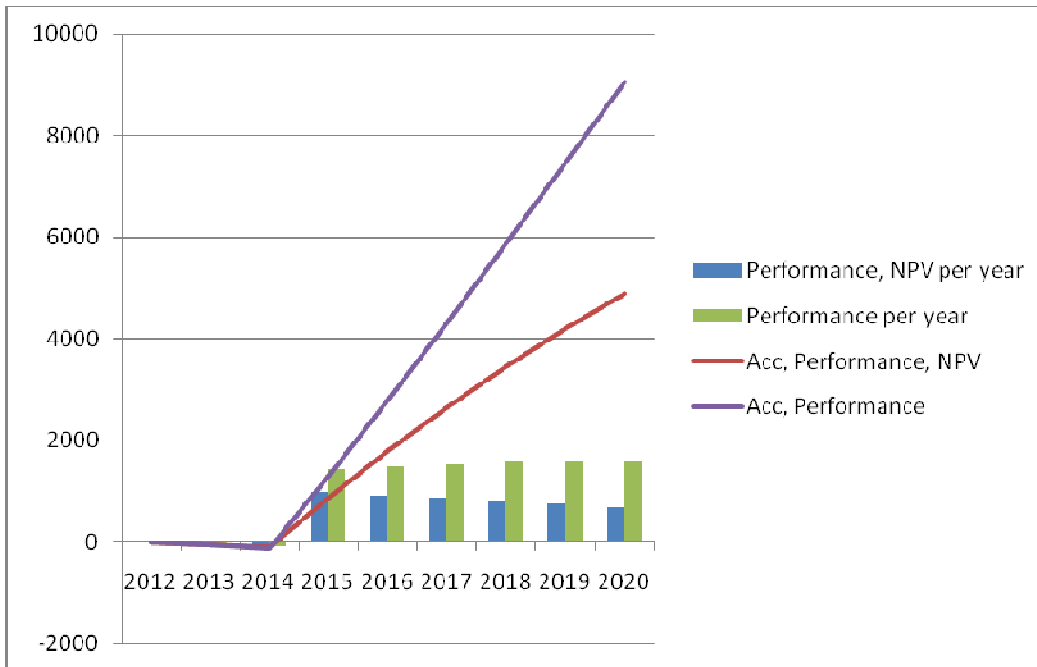


Figure 36: Performance scenario, IWP 12, Joint procurement of systems: Cash and NPV per year and accumulated (1.000 EUR)

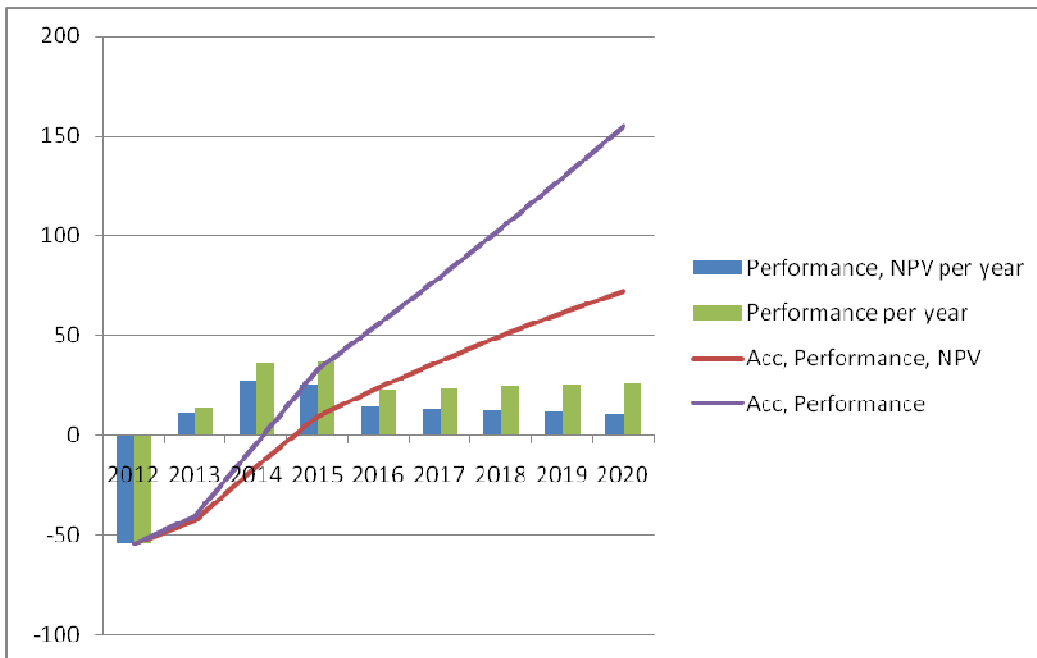
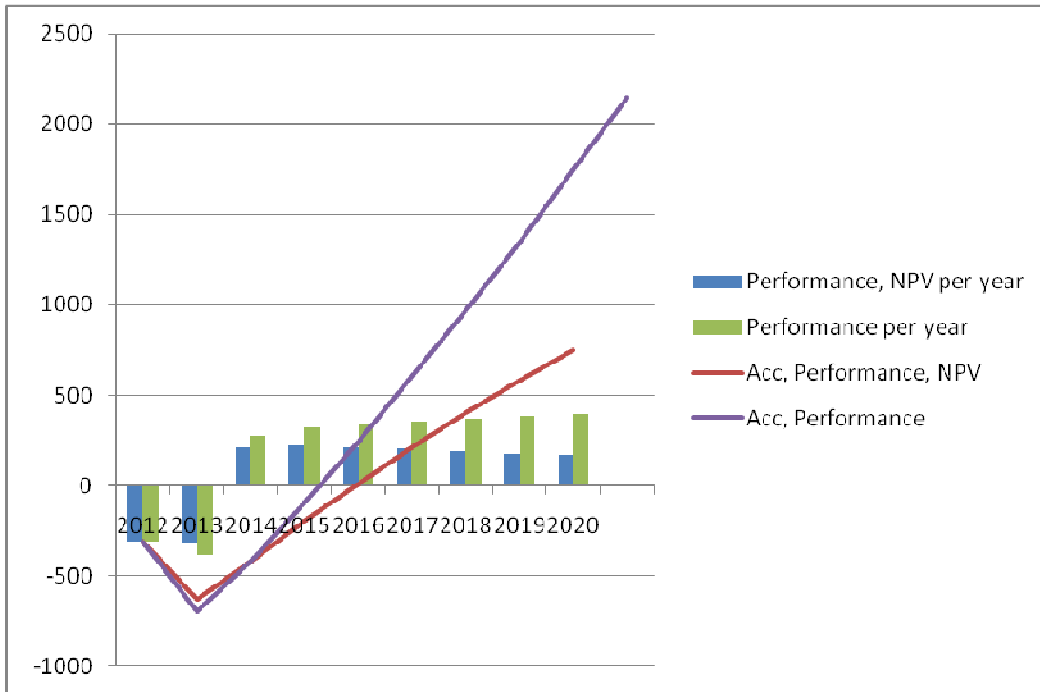


Figure 37: Performance scenario, IWP 13, Safety Management Systems: Cash and NPV per year and accumulated (1.000 EUR)



10 EVALUATION OF NON-FINANCIAL EFFECTS

The main expected non-financial benefits of NEFAB are described below. As the Minimum and Performance scenarios both build on the same initiatives, the same benefit areas will apply in all scenarios.

Overall, however, the Performance scenario is likely to contribute further to the benefit areas, as it aims to achieve a higher degree of cooperation, commonality and use of NEFAB best practice.

The table below gives an overview of which initiatives help contribute to identified non-financial benefits, and is followed by a brief description of each internal benefit area. External benefits will be described and evaluated in the socioeconomic analysis.

Table 8: Indicative initiative contribution to non-financial benefits

		Initiatives	01 - ATS route structure and sectorisation	03 - Optimisation of ATS	04 - Optimisation of ASM and ATFCM	05a – ARO, Briefing & AIS/AIM	05b – Procurement of MET services	06 - Harmonisation of Rules and Procedures	07 - Optimisation of Training services	08 – Supervision and monitoring of CNS infra.	09 - Commonality of CNS/ATM systems	10 - Joint evaluation of CNS & ATM technology	11 - Common System Maintenance	12 - Joint procurement (of systems)	13 - Safety Management Systems	00 - Implementation of NEFAB Business Model
External Benefit Areas	Safety	√	√	√				√	√		√				√	
	Capacity	√	√	√												
	Environment	√	√	√					√	√	√					
	Customer orientation (airlines and passengers)	√	√	√	√			√				√				
	Contingency		√	√				√		√	√					
Internal Benefit Areas	Competence sharing and development		√			√		√	√		√		√	√		
	Influence over suppliers & regulators						√	√	√			√				

10.1 Internal non-financial effects

Competence sharing and development

Common training, common ways of working and increasing cooperation and centralisation provides opportunities for competence sharing and development across the NEFAB area. This benefit is foreseen to be higher in the Performance scenario, when a higher degree of cooperation and harmonisation is foreseen:

- Common training content creates increased career opportunities across NEFAB as movement of staff is facilitated.
- Increased coordination and prospective sharing of resources may also make room for specialists which each individual ANSP cannot afford of use effectively
- Common specialist resources will enable sharing of best practices and increase the level of competence. For example, sharing of specialists for technical evaluations will result in better quality in evaluations

Influence over suppliers, regulators and others

The influence over suppliers, regulators and others is highly dependent on the business model for the ANSPs and the model for FAB Governance. The benefit is foreseen both in the Minimum and in the Performance scenario, but is expected to be higher in the Performance scenario due to a higher degree of cooperation and integration. Given the business and governance model chosen, the increased level of cooperation within NEFAB may provide the opportunity to:

- Increase ANSP procurement leverage towards suppliers, thereby securing better terms and prices, e.g. one common replacement plan is foreseen for the CNS infrastructure
- Increase negotiation leverage towards regulators in order to ensure regulation that supports harmonisation and integration, e.g. a common ANSP view on the NEFAB strategic issues will potentially help to increase the joint NEFAB ANSP influence on forthcoming regulations that will impact NEFAB.
- Increase negotiation leverage towards adjacent air spaces (FABs and ANSPs) and at the European level e.g. EU, EUROCONTROL and SESAR

11 HIGH LEVEL RISK ASSESSMENT AND SENSITIVITY ANALYSIS

11.1 General risk assessment

A number of overall general risks have been identified that affect most or all of the initiatives. These risks are related to a number of different internal and external stakeholders and include regulatory, operational, financial as well as cultural issues. The high level risks are summarised in the table overleaf.

The general and specific risks per initiative indicate that NEFAB has a risk profile, which must be dealt with in the next phases of the NEFAB project. This will be essential in order to meet the objectives of NEFAB and avoid excessive costs and use of resources, delays and a non fulfilled benefit potential.

Hence, the risks are of importance to the CBA, as a failure to mitigate them will have adverse effects on benefit realisation.

A sensitivity analysis can be a useful tool in order to assess the financial impact of risks. However, the risk profile of NEFAB implies that a credible “best” and “worst” impact scenario is difficult to develop. Such a scenario/analysis would risk giving a false impression of accuracy, rather than a true depiction of the risks.

Hence, no comprehensive sensitivity analysis has been made based on the identified risks. The main approach to handle risks in the CBA has been to evaluate them for each initiative, to attempt to keep estimates conservative, and to clearly specify where assumptions and preconditions have been made.

Nevertheless, it is of value to understand the drivers for the overall business case, and how sensitive the different components are to changes in key assumptions. For this purpose, the following parameters are investigated and discussed in this chapter:

- Changes to the discount rate. As the choice of discount rate has an effect on the net present value, it is relevant to understand how this changes if a different discount rate is used.
- Relative benefit contribution of the initiatives. This is helpful to understand which initiatives are the most critical for benefit realisation.

Table 9: Identified high level risks for NEFAB implementation¹⁹

	Risk	Description	Prob.	Impact
1	Constraints from ICAO rules & regulations	ICAO requirements regarding service provision, including the area of responsibility of a service provider, pose potential limitations to cross border functionalities.	L	M
2	European Commission regulations requirements	While the EC regulations as such do not pose a risk to FAB development they might require additional or different measures to those listed in the IWPs. Furthermore, the timelines for implementation might differ from those outlined	M	L
3	Constraints from EASA / Eurocontrol regulations and requirements	EASA and / or Eurocontrol requirements and implementation rules may have a different ambition level and functional requirements to those outlined.	L	M
4	Constraints from National laws and regulations	Differences in the national laws, aviation acts, and other associated regulations may pose a risk to NEFAB development, especially in cross border operations and delegating responsibilities to centralised units.	M	H
5	National militaries and national sovereignty issues	Military interests within the NEFAB states differ somewhat due to issues such as operational requirements, geopolitical issues, partnership agreements and alliances and so forth. Unless the different military requirements and sovereignty issues can be accommodated in an acceptable yet harmonized way, this poses a major risk to the FAB development, especially within ASM improvements.	L	H
6	Diverse national ANSP interests	The national service providers have their interests in both resource utilization and revenue sharing. ANSP commitment and common agreement between them is at the very core of the success NEFAB harmonisation and joint airspace will require a certain level of integration and commonality of ATM/CNS systems to harvest benefits in the systems area. This will result in a decrease in infrastructure independence, which might not be deemed desirable from a national and sovereignty point of view.	M	H
7	Lack of political agreement	When dealing with issues such as combining service provision units, political level agreements will be required (parliamentary and/or ministry level). Unless a common understanding between the states on the service provision principles can be assured, the centralization of units may prove to be impossible.	M	H
8	Capacity and resource constraints	The implementation of the NEFAB initiatives within the outlined timescales will require quite a substantial effort in terms of ANSP resources, competences and management effort. This might result in resource bottlenecks, lack of competences when required and long lead-times for decision making.	H	H
9	Cultural and organisational differences	Different operational practices, rules and procedures have developed over time also reflecting different operational cultures in each ANSP. Likewise different management and decision making cultures exist in each ANSP and in their relations to external stakeholders like authorities, military and NSAs. These differences might hamper harmonisation, integration and decision making	H	M
10	Systems complexity	Systems complexity in terms of different system configurations, different suppliers, different system lifecycles, different approached to system development and maintenance and the availability of new technologies might make it more costly to achieve the expected benefits and extend implementation timelines.	H	M

¹⁹ For details regarding the risk assessment, see CBA per initiative appendices

11.2 Changes to the discount rate

For the purpose of the CBA, a discount rate of 10% is used. By applying a discount rate of for instance 5%, the net present value increases in both the Minimum and Performance scenario. It should be remembered that the discount rate is subjectively or politically fixed rate which expresses the investors' expectations and requirements regarding the return on the investment. If the politicians and ANSP authorities are satisfied with a return on the investment of for instance 5% the entire NEFAB project will represent a much better business case.

The difference is rather substantial in both scenarios, with an increase in NPV from approximately -0,3 to 1,1 MEUR in the Minimum scenario, and from 18,9 to 29,7 MEUR in the Performance scenario.

Table 10: Internal net present value using a discount rate of 5% and 10% (MEUR)

	Minimum Scenario		Performance Scenario	
	10% discount rate	5% discount rate	10% discount rate	5% discount rate
Net Present Value (NPV) 2012-2020	-0,3	1,1	18,9	29,7
Net Present Value (NPV) 2012-2030	11,0	19,1	51,8	82,2

11.3 Relative net benefit contribution of the initiatives

From an internal benefit realisation point of view, it is relevant to consider the relative contribution of the different initiatives, as that highlights which initiatives are the most critical for the CBA.

An investigation of the scenarios reveals that the spread between the NEFAB initiatives is considerable, and that the top three benefit drivers hold a significant share of the total net present value. This is especially true for the Minimum scenario, where Commonality of CNS/ATM systems (IWP09), Optimization of training (IWP 7), Procurement of MET (IWP05b) and Optimisation of ATS (IWP03) are the main drivers.

In the Performance scenario, the Ancillary Services - ARO, Briefing & AIS/AIM (IWP 5a), Ancillary Services – Procurement of MET (IWP 5b) and Optimisation of training services (IWP 7) are the main financial drivers.

However, it should be remembered that several of the positive and negative IWPs are interrelated and that it is not possible to “cherry pick” only the IWPs with a positive financial result.

Figure 38: Relative benefit contribution in the Minimum scenarios

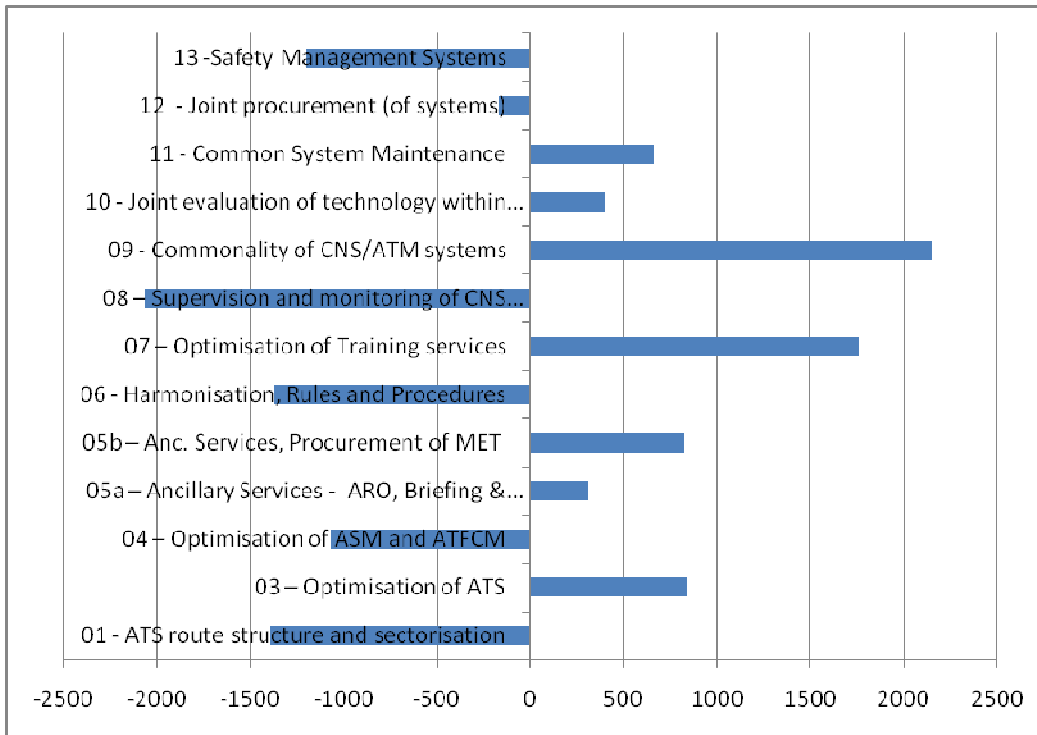
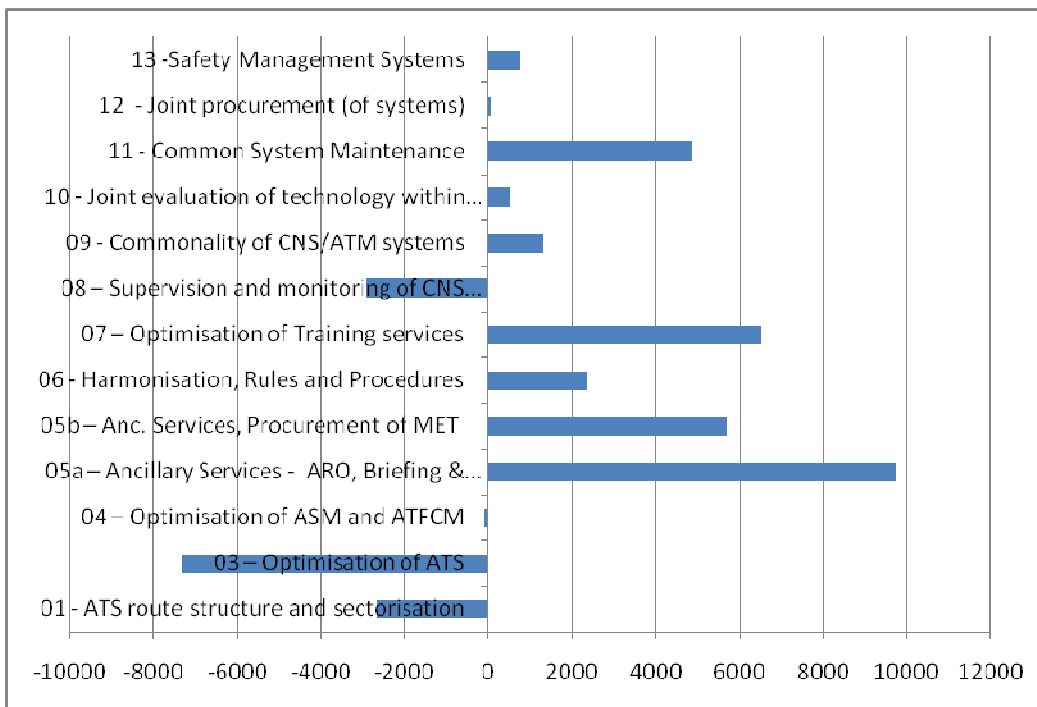


Figure 39: Relative benefit contribution in the Performance scenarios



In particular for the Minimum scenario, IWP07 will be critical, as a failure to realise benefits identified in Training will have a significant impact on the internal benefits, which could delay the break-even point significantly.

It is also important to keep in mind that there are a number of enablers for NEFAB that will be necessary for NEFAB to implement. Hence, without them the potential in the top benefit drivers will not be possible to realise

Important such enablers for NEFAB include:

- ATS-routes and sectorisation (IWP01)
- Optimisation of ASM and ATFCM (IWP04)
- Harmonisation of Rules and Procedures (IWP06) and of Safety Management Systems (IWP13)
- Supervision and monitoring of CNS infrastructure (IWP08)

In particular in the minimum scenario these initiatives contribute to a negative internal financial effect in the time period 2011-2020. Hence, for these it will not only be important to drive out identified benefits, but also critical to keep costs under control.

The comparatively uneven distribution of costs and benefits over the initiatives, combined with the high risk profile of NEFAB, indicates that the implementation may pose challenges in terms of managing the time line and resources, to avoid delays and excessive costs.

12 CONCLUSIONS

Results of the internal cost benefit analysis

The internal cost benefit analysis of NEFAB indicates that the Minimum and the Performance scenario both have an overall positive cash effect in 2020 even though the effect in the Minimum scenario is rather small. The 2020 Performance scenario contains a significantly higher cash effect than the Minimum scenario. This higher benefit potential is mainly due to a higher ambition level in terms of integration and centralisation of tasks, as well as a more aggressive time line for implementation.

Furthermore, the Performance scenario is expected to have a shorter pay-back time, with a break-even in 2020 compared to a break-even in 2020 in the Minimum scenario. None of the scenarios reach break-even by the 2015 milestone, which implies that implementation activities beyond the 2015 Vision will be important in order to support an overall added value for NEFAB.

Table 11: Summary of NEFAB internal financial implications per scenario (MEUR)

	2020 Minimum Scenario	2020 Performance Scenario	2030 Minimum Scenario	2030 Performance Scenario
Present value of cash flow	3,0	42,6	46,4	168,7
Net Present Value (NPV)	-0,3	18,9	11,0	51,8
Estimated break-even point (payback time)	2021	2017	2021	2017

A key reason for the late break-even point is that a substantial degree of coordination and harmonisation work between the ANSPs will be required 2012-2015. To achieve the NEFAB Vision as “the best performing airspace in Europe”, airspace design activities will be performed, operating procedures and ways of working need to be aligned, and necessary FAB-wide organisation and governance structures need to be put in place.

Internal financial benefits have mainly been identified within the following areas:

- Optimised use of ATCOs as a result of airspace improvements and thereby overall reductions in controller workload. This implies that a foreseen capacity increase until 2020 can be managed with a relatively lower increase of ATCOs, hence reducing the future recruitment need.
- Integration and centralisation of tasks and functions, creating potential to reduce overhead, eliminate duplication of tasks and increase specialisation. This is a main benefit area that drives savings especially in the Performance scenario. Among other areas, integration and centralisation is foreseen within ASM & ATFCM, ancillary services, rules and procedures, training, supervision of CNS and safety management
- Common procurement of services, increasing the bargaining power and enabling lower procurement costs. This is foreseen for training as well as for MET services
- CNS infrastructure. Here relative quick wins have been identified, to reduce investment level for system implementation driven by SESAR. Commonality of systems is also foreseen to enable joint level 2 maintenance. Additional potential in terms of investment level is expected to exist but has not been

possible to quantify in 2010, as a more detailed understanding of a potential common investment plan in NEFAB is deemed necessary.

The analysis indicates that the level of centralisation and integration is an important factor in order to reap maximum benefits. In the Minimum scenario, the identified internal benefit potential is limited, as foreseen efficiency improvements from harmonisation are restricted..

Reflections regarding results and suggestions going forward

Given the complexity of cooperation between the four ANSPs, together with the regulatory, financial, cultural and language boundaries that exist, and given the time line for implementation, benefit realisation is foreseen to require substantial efforts. Successful implementation of NEFAB, in particular the Performance scenario, will require strong commitment from ANSPs and stakeholders, as well as a clear prioritisation of NEFAB among other ongoing improvement activities.

Nevertheless, the current CBA is seen as a relatively realistic evaluation of the benefit potential in NEFAB. Assumptions and estimates have been kept conservative.

It should be noted that NEFAB also aims to achieve a number of external benefits. These external benefits are accounted for in the socioeconomic analysis, while the costs to realise them will be internal and are accounted for in the CBA. Hence both the internal CBA and the external benefits in the socioeconomic analysis must be taken into account when assessing the overall financial effects of NEFAB.

Moreover, given a desire to increase the internal financial savings and strengthen the business case further, there is potential to expand the scope of current initiatives, or include new areas in the CBA. Prospective such areas, which have been identified during the project work but have not yet been assessed, include:

- Investigation of the possibility to reduce the total number of ATCCs to a minimum of 4 (one ATCC per state)
- Investigation of potential for night time and/or holiday closures of control centres
- Investigation of business opportunities within AIM, as well as potential for common investments in ARO, briefing and AIS/AIM systems
- Investigation of potential to broaden scope of rules and procedures to include a wider definition of work
- Investigation of the entire training value chain, and expansion of scope to include refresher and contingency training, as well as common selection criteria and a common centralised recruitment process
- Investigation of potential in overall systems investment level, including development of a common investment plan and strategy
- Investigation of benefit potential for cooperation within level 1 system maintenance
- Expansion of scope of Safety Management Systems to include total ANS Management Systems
- Investigation of potential for integration of administrative support functions, such as Finance, HR and IT

- Investigation of potential for rationalisation of management layers across the NEFAB initiatives

In conclusion, while the internal benefit potential for the Minimum scenario is limited, the CBA for the Performance scenario displays significant benefit potential. It is built on integration of a number of tasks and functions, and a relatively ambitious time line. As such it will require strong commitment to realise.