UK-Ireland FAB

Cost-Benefit Analysis

To support:

COMMISSION REGULATION (EU) No 176/2011
[Implementing Rule on Establishment & Modification of FABs]

FINAL 9th Jan 2012 – Appendix I

Appendix I: UK-IRELAND FAB Cost Benefit Analysis

1. Previous Cost-Benefit Analysis work:

As part of the original UK-IRELAND FAB May 2008 proposal, the ANSPs conducted a high-level Cost-Benefit Analysis (CBA), which complied with the regulatory requirements laid down under SES 1 legislation (See Appendix A: UK-Ireland FAB Proposal May 2008, section 5.3. pages 75-85).

The conclusion of this original CBA work was that the FAB would add value and that financial savings to airline customers, in terms of service quality benefits, which were estimated as follows;

- By 2013: €12m per annum, through delay savings, reduced fuel-burn and CO2 emissions savings,
- By 2018: €40m per annum indicative savings by 2018, through fuel savings, delay savings, sector savings from airspace redesign, CNS/ATM technology savings.

2. New CBA requirement and new UK-Ireland CBA:

The requirements of the FAB IR lays down additional specific requirements for the development of the FAB CBA. PART II Requirements of Article 9a(2) of regulation (EC) No 550/2004, (4), confirms the requirements as follows;

The Member States concerned shall provide statements confirming that:

(a) the cost-benefit analysis was conducted according to industry standard practice, using among others discounted cash flow analysis;

(b) the cost-benefit analysis provides a consolidated view of the impact of the establishment or modification of the functional airspace block on the civil and military airspace users;

(c) the cost-benefit analysis demonstrates an overall positive financial result (net present value and/or internal rate of return) for the establishment or modification of the functional airspace block;

(d) the functional airspace block contributes to a reduction of the aviation environmental impact;

(e) values for costs and benefits, their sources and the assumptions made to develop the cost-benefit analysis were documented;

(f) the main stakeholders were consulted and provided feedback on the costs and benefit estimates which are applicable to their operations.

The UK-IRELAND FAB has developed a CBA, which complies fully with specific CBA criteria outlined above. In developing this CBA, account has also been taken of the information provided by the European Commission through its published Guidance Material.

A distinct advantage has resulted in carrying out this exercise; the FAB has been able review its progress to-date, which has helped to revalidate its positive and increasing net contribution to airspace users.

3. Methodology for the CBA

3.1. CBA Objective

Due to the operational nature of the UK-Ireland FAB, the aim of the CBA is to analyse and estimate:

- the 'benefits', in terms of enabled financial and environmental savings to airspace customers, as a result of operational projects implemented by the FAB, and

- the 'costs' in terms ANSP investment and operating costs for the FAB.

The primary objective of this analysis is to show if the enabled savings secured by customers as a result of the operational projects implemented by the FAB, exceed the ANSP implementation and operating costs, and if this shows a positive Net Present Value (NPV).

3.2. Process for the assessment of operational projects

The CBA presents the customer savings for projects which can be quantified, as well as the qualitative benefits for all projects to-date. Due to the pre-existing nature of the FAB all operational projects, which have been recorded in the FAB Reports for 2009 and 2010 or the previous and existing UK-Ireland FAB Plans, were examined and analysed for their estimated savings to-date, which were extrapolated into the future.

The quantitative assessment required the examination of historic project data in terms of estimated fuel tonnes savings for each project. In some instances, distance savings, were utilised to estimate the non-fuel direct cost savings (in terms of reduced maintenance, reduced crew, and reduced aircraft ownership costs), i.e. the estimated savings in reduced "Delay Costs Per Minute".

For the period 2009 – 2011, refined estimated savings data were established using historic fuel cost and traffic growth figures. For the period of 2012-2020, the estimated savings were extrapolated by applying traffic forecast estimates and other key variables.

3.3. Time period and Discount Rate for the CBA

The period in question covers from 2008 – 2020 (13 years):

- Starting point: The UK-Ireland FAB was declared to the EU in June 2008, with the first formal ANSP FAB Management Board occurring at that time. Therefore, all work associated with the initial implementation phase of the FAB from that point forward has been included in the timescale. Although a number of 'quick win' projects were implemented during the later half of 2008, the UK-Ireland FAB did not implement any operational projects, during this 2008 period, which delivered enabled customer savings; however, costs were incurred during this initial period.

- End point: To coincide with the SESAR 2020 roadmap and the commencement of the third reference period for the performance regime (RP3), the UK-Ireland FAB has elected to end the CBA in 2020, rather than a twenty-year time horizon, which is often utilised for NPV calculations. This is also deemed beneficial to evaluate the CBA in the context of published European ATM targets to be achieved by 2020.

In the absence of an average airline Discount Rate, the discount rate used for this CBA is 7.25%, which is an average for the nominal discount rate for the IAA and NATS.

3.4. Data variables

(a) Exchange rates

Source: oanda.com

Period	Euro	GBP	USD
Avg 2008	€1.00	£0.7958	$1.4709
Avg 2009	€ 1.00	£0.8912	$1.3942
Avg 2010	€ 1.00	£0.8583	$1.3275
Avg 2011 YTD (up to 1st Dec)	€ 1.00	£0.8712	$1.4090

(b) Ratio of Fuel tonne : CO2 tonne

In line with industry standard calculations, the ratio of 3.18 is applied to the ratio of fuel tonne to CO2 tonne, e.g. 1 tonne fuel = 3.18 tonne CO2

(c) Fuel Costs per tonne

Source: USD 20.09.11: www.platts.com

Period	2009 Actual Avg	2010 Actual Avg	2011 YTD Avg	2012 Forecast
USD	$529	$711	$1,028	$1,046
EUR (converted)	€379	€536	€730	€742
GBP (Converted)	£338	£460	£636	£647

(d) Emissions trading Scheme (ETS) – CO2 Costs per tonne

Source: IATA Economics, 18/7/2011

In July 2011, IATA estimated that the cost per tonne of CO2 would be €13.00 in 2012, rising to €20.00 in 2020. Therefore for the purposes of the CBA, an additional €1.00 has been added per annum up to the year 2019, resulting in the following table:

Estimated Costs per tonne CO2 (commencing 2012)								
2012	2013	2014	2015	2016	2017	2018	2019	2020
€ 13.00	€ 14.00	€ 15.00	€ 16.00	€ 17.00	€ 18.00	€ 19.00	€ 20.00	€ 20.00

(e) Traffic Forecast

Source: EUROCONTROL Medium-Term Forecast Flight Movements 2011-17, 24th October 2011

The UK-Ireland FAB actual and forested movements for the EUROCONTROL Medium-Term Forecast Flight Movements 2011-17, October 2011 (Annual IFR Movements and Growth Rates) were utilised. Furthermore, as the EUROCONTROL Forecast only runs as far as 2017, the average annual growth rate (AAGR) for the years 2011-17 was applied to the years 2018-2020 to complete the CBA time period. This methodology resulted in the following table (which includes low, baseline and high case scenarios):

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	Actual		STATFOR Forecast							Apply AAGR 2011-17		
H			2,314	2,356	2,426	2,502	2,572	2,647	2,716	2,795	2,876	2,959
B	2,316	2,216	2,294	2,326	2,369	2,419	2,469	2,522	2,564	2,618	2,673	2,729
L			2,280	2,298	2,328	2,362	2,395	2,432	2,458	2,495	2,532	2,570
H			4.4%	1.8%	3.0%	3.1%	2.8%	2.9%	2.6%	2.9%	2.9%	2.9%
B	-9.5%	-4.3%	3.5%	1.4%	1.9%	2.1%	2.1%	2.2%	1.7%	2.1%	2.1%	2.1%
L			2.9%	0.8%	1.3%	1.5%	1.4%	1.5%	1.1%	1.5%	1.5%	1.5%

(f) Non-fuel costs savings - Delay Costs Per Minute

Source: Standard Inputs for EUROCONTROL Cost Benefit Analyses, Edition Number: 4.0, October 2009

A value of **€35** per minute is utilised to calculate the estimated savings in reduced Delay Costs Per Minute, derived from the reduced distance 'strategic airborne savings' (which are provided to customers due to their ability to plan for more optimal routes in advance). The figure of €35 comprises of maintenance costs (€12), crew costs (€9) and aircraft ownership costs (€14).

The above values contained in the 2009 Standard Inputs document were based on a methodology, first presented by the University of Westminster in a report published in 2004, and updated during in 2008 by means of a series of technical discussion documents.

3.5. Internal and External Review process: Validation of Approach

To ensure that that the methodology and approach was conducted according to industry standard practice, draft material for this CBA was examined by qualified experts within the IAA and NATS. This information was used to refine the CBA model on the basis of collective expert assessments.

Draft	Review process
Development Phase	▪ Discussions at Director level in IAA and NATS on the proposed CBA methodology. ▪ Discussions with professionally qualified financial experts on proposed CBA methodology.
Draft 1 30th Sept 2011	▪ Reviewed at a joint NSA/ANSP meeting, 6th Oct. ▪ Reviewed by NATS professional experts by teleconference, 7th Oct. ▪ Reviewed by Operational and Customer representatives at an ANSP C3 meeting, 18th Oct. ▪ Numerous ad-hoc discussions with ANSP and customer contacts to validate data inputs.
Draft 2 27th Oct 2011	▪ Presented to KPMG 28th Oct. ▪ Feedback meeting with KPMG, 21st Nov.
Draft 3 23rd Nov 2011	▪ Issued to KPMG, 23rd Nov. ▪ Feedback provided to IAA 24th Nov.
Draft 4 28th Nov 2011	▪ Issued to KPMG, 28th Nov ▪ Reviewed by NATS professional experts 29th Nov.
Draft 5 29th Nov 2011	▪ Issued to NATS and reviewed by NATS professional experts 29th Nov.
Draft 6 30th Nov 2011 and Draft 7 1st Dec 2011	▪ Issued to KPMG, 30th Nov ▪ Issued to KPMG, 1st Dec ▪ Approval in principle, subject to any further changes as a result of customer consultation (as per the agreement set-out below)
Draft Final (i.e. Draft 7 1st Dec 2011)	▪ Issued to the ANSP FAB Management Board (includes MIL, Airline and ANSP representatives), 2nd Dec and secured approval on the 6th Dec. ▪ Presented to airline customers, 7th Dec, and copy released for consultation (7th – 21st Dec).
Draft Final – Draft 8, 13th Dec 2011	▪ Version for circulation to FAB Management Board and FAB Supervisory Committee (part of the overall FAB IR Draft Final documentation).
Final 9th Jan 2012	▪ This document.

Furthermore, on behalf of the FAB, the IAA contracted KPMG to conduct an external review, based on the following terms:

- *"review the CBA Report for the UK-Ireland FAB to consider if:*

  (a) it was conducted according to industry standard practice as stated in the CBA guidance contained in the EUROCONTROL document "D06-06 - ATM CBA for Beginners – Edition 00.01.00" provided to KPMG by the Client; and

  (b) it broadly follows the European Commission Guidence material as advised to us by the Client (i.e. as per the following link http://www.skybrary.aero/index.php/7.4.05_Cost-benefit_analyses)

  For the avoidance of doubt KPMG will not consider the specific inputs into the FAB CBA and will give no opinion in this regard;

- *review the underlying financial model ("the Model") and report to you on whether, in our opinion:*

  - *so far as its mechanical construction is concerned, it has been constructed appropriately so as to achieve the objectives which it was designed to meet; and*

  - *the calculations in the model are arithmetically correct.*

  Our work in respect of the Model will be limited to the matters set out above and accordingly will not include, for the avoidance of doubt, any form of review of:

  - *the commercial merits or technical feasibility;*

  - *the factual accuracy of the input data and the validity or reasonableness of the underlying assumptions; or*

  - *the key accounting or tax assumptions used in the Model and accordingly we will express no opinion thereon."*

Please see Appendix J, KPMG Letter to IAA concerning the UK-Ireland FAB CBA.

4. FAB projects – Benefits / Enabled Savings:

As mentioned in section 3.2 above, all operational projects, contained in the existing FAB Plan 2011-14 or previous FAB Plans or FAB Reports for 2009 and 2010, were assessed to confirm their quantitative and qualitative savings.

4.1. Qualitative Benefits

The table below presents the qualitative benefits assessed for all FAB projects to-date, under the management of the Safety Working Group (SWG), Service Provision Working Group (SPWG), Airspace Design Working Group (ADWG), and the Technology Coordination Group (TCG).

These benefits are absolutely critical in terms of their positive contribution to the FAB in terms of benefits to all stakeholders (to the ANSPs and to the MIL and Civil airspace users). It is essential to take these qualitative benefits into consideration as part of the consolidated CBA assessment process.

For the most part, the primary qualitative benefits relate to;

- Enhanced safety and safety harmonisation,
- More effective tactical and strategic planning between the ANSPs,
- More efficient network management,
- Enhanced coordination on airspace design and cross-FIR airspace management, and
- Collaborative Technical opportunities and SESAR alignment.

These qualitative benefits are presented in the table below. A number of these operational projects are or will provide more efficient user profiles and will therefore deliver customer savings in terms of reduced fuel, CO2, and track miles. This information forms the basis of Section 4.2. Quantitative Savings, i.e. a cornerstone of the FAB CBA.

Ref Code	Ref Name	Project Status	Qualitative Benefits
Safety Working Group (SWG)			
SWG-1	Use of a common en-route Safety Significant Event (SSE) scheme	Completed by Dec 2009 – including completion of the first FAB SSE Report in 2010.	SSE scheme gives more targeted analysis to the ESARR 2 categories. ANSP safety performance information can be compared in a reliable way.
SWG-2	Safety Culture/climate measurement	Completed by Nov 2009 – including Risk Conference and development and "Action Plan for Safety Improvement".	This type of analysis can uncover mismatches that underlay dysfunctional interfaces; this is an enabler to the development of a homogenous safety culture across sector interfaces and units.
SWG-3	Interface between IAA and NATS sectors	Completed in 2009 – including completion of "Day to Day Observations Report"	Objective data to improve the sector interfaces and operating techniques and provides baseline dataset for comparative measurements to assess the effectiveness of changes and normal operations across the sector interface.
SWG-4	Standardising procedures to minimise differences from ICAO	Subsumed into SWG-9 Standardising European Rules of the Air (SERA).	See SWG-9 below
SWG-5	SMS Harmonsiation	Project on track for completion in 2012. The project has been refocused to provide for collaboration with other FABs to future proof SMS harmonisation strategy.	Elimination of inconsistencies in SMS and synergies in documentation, training, application etc.
SWG-6	Safety priority areas	Implemented in full during 2009.	Operational Safety Improvement and a single forums which covers both the UK and Ireland that avoids duplication of meeting structure.

Ref Code	Ref Name	Project Status	Qualitative Benefits
SWG-7	Safety Culture Improvement	Project on track for completion in 2012. Initial phase has been completed via the measurement of safety culture by each organisation, work is continuing through a step by step strategy focused on delivering Safety Culture Improvement quick wins.	Provides clarity for staff, management and regulators on how safety culture can be improved by the application of a just culture policy. Consistency of safety occurrence reporting, investigation and improvement in the FAB. Improved safety leadership behaviour within the FAB.
SWG-8	FAB Action Plan for Operational Safety Improvement 2010-11	Project on track for completion in 2013. Day-to-day operational surveys were conducted during 2009 and 2010 and further surveys are planned during 2011.	Delivery of a measurable process for prioritising safety improvement across the FAB and sharing of best practice within the IAA and NATS and also with NEAP partners.
SWG-9	SWG-9 Standardising European Rules of the Air (SERA)	Project on track; aiming to deliver a harmonised approach to SERA	Greater standardisation of procedures between NATS and the IAA; Provides the pre-cursor work in readiness for SERA Parts A/B/C Introduction.
Service Provision Working Group (SPWG)			
SPWG-1	Single FAB RAD	Completed in April 2010: Single FAB RAD Publication. Project now subsumed into SPWG-14(O) Network Management Organisation.	The airspace will be regarded as one continuum and restrictions will be assessed jointly and published as one integrated document.
SPWG-2	Single Pre-Tactical Plan Publication	Completed in April 210: Publication of the daily “FAB Pre-tactical Network Brief”.	Provides more effective daily coordination.
SPWG-3	Single Strategic FMP Planning Process	Completed by Sept 2010: Joint publication of an 8-week strategic briefing document.	Provides more effective 8-week coordination.
SPWG-4	Demand Modelling	Activity closed in 2010: Due to the traffic downturn, the model does not adequately support the needs of the FAB.	N/A
SPWG-5	ASM Interaction Between the States	Activity closed in 2010: Work being developed by ODNET through JFADT initially.	N/A
SPWG-6	CDR Improvements	Activity closed in 2010: Superseded by ENSURE project.	See ADWG-8

Ref Code	Ref Name	Project Status	Qualitative Benefits
SPWG-7	Development of Cross Border Areas (CBAs)	Completed in 2010: Agreement that FIR/UIR boundaries are no longer constraint to airspace/service provision development.	This is an enabler to allow for future Civil and MIL cross-FIR proposals.
SPWG-8	ASM Improvements – Joint Airspace Management System (JAMS)	In 2010: Agreement to move to LARA.	LARA tool will provide advance notification of route opportunities for more efficient routings.
SPWG-9	Single Pre-Tactical Planning Process	Merged with SPWG-2 above.	N/A
SPWG-10	Integrated AMC Activity	Merged with SPWG-5 above.	N/A
SPWG-11(O)	TOMS Utilisation in FAB	Project on track: To enhance Network Management, the IAA will be installing the tool by the end of 2011. Project now subsumed into SPWG-14(O) Network Management Organisation.	Staff in all the centres can review the same data for decision making, thereby improving efficiency and the level of service to customers.
SPWG-12	Enable Tactical Delegation of Sectors Between ANSPs	Activity closed in 2009: See ADWG-21(O) FAB High Level Sectors instead	N/A
SPWG-13	Reduced Longitudinal Separation on the NAT	Project on track for completion in March 2012 (following completion of 12-month trial).	The work load of ATC staff will be reduced at the interface sectors in the provision of climb for traffic exiting the NAT eastbound.
SPWG-14(O)	UK-Ireland FAB Network Management Organisation	Project on track for completion in March 2012. This project has subsumed various sub-projects relating to FAB RAD, NERS, LARA and TOMS.	The overall benefit of a regional UK-Ireland FAB Network Management process will result in a more efficient network which will reduce delays, reduce track miles, and reduce CO2 emissions.
SPWG-15(O)	NERS Management Group and Process	Project completed with the reduction of NERS from 12 to 4 airports. However, the FAB is aiming to remove these additional airports and so the project is now subsumed into SPWG-14(O) Network Management Organisation.	Improved efficiency.
SPWG-16(O)	Tactical Management of LHR-NAT departures	Activity closed in 2011: A local LHR network management process has been developed to balance SID demand and notify tactical offloads on Pretact Plan to state that there is a risk of heavy SID loading the	N/A

Ref Code	Ref Name	Project Status	Qualitative Benefits
		following day.	
SPWG-17(O)	NAT Management Coordination / late running NAT traffic	Transferred to Opportunities Register: In line with the traffic downturn, the issue associated with late running NAT traffic is not currently deemed to be a significant problem.	N/A
SPWG-18(O)	Reduced lateral separation on the NAT	Transferred to Opportunities Register: May 2011: R-Lat project deferred to post-2015 due to ICAO IMG Meeting 38 Decision	N/A
SPWG-19	CPDLC ConOps Alignment	Work underway in late 2011 to align the ANSPs for the CPDLC 2013 mandate	Alignment will benefit airspace users and generate ANSP efficiencies.
SPWG-20	Enhanced Customer Communications	New to FAB Plan 2011-14	Ability to jointly engage and consult with all IAA and NATS customers. Key enabler to agree customer priorities.
Airspace Design Working Group (SPWG)			
ADWG-1	FAB ADWG Attendance on West End Tiger Team	Completed in Q1 2009.	Enhanced ANSP coordination on hotspots.
ADWG-2	Miles In Trail – between Dublin & Swanwick	Completed assessment process in 2009.	Reduction in the application of more penal ATM Regulations
ADWG-3	Environmental Best Practice	Completed in 2009: IAA adopted NATS 'Environment by Design' best practice.	Enhanced ANSP coordination on environmental airspace design management.
ADWG-4	Jointly owned Oceanic Domestic Interface Roadmap	Completed Mar 2009.	Enhanced ANSP coordination.
ADWG-5	Oceanic Domestic Interface Management System (ODIMS)	Transferred to Opportunities Register: In line with the traffic downturn, the requirement for this tool has been reduced.	N/A
ADWG-6	Removal of MNPS requirement in NOTA and SOTA	Completed in May 2009.	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-7	P600 airway	Completed in May 2009.	More efficient user profiles delivering customer savings in terms of Fuel, CO2,

Ref Code	Ref Name	Project Status	Qualitative Benefits
			track miles: See section 4.2
ADWG-8	ENSURE Project	Completed in Dec 2009 with removal of routes in Shannon UIR.	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-9	Development of an Oceanic Domestic Interface CONOPS	Initial phase completed via the development of an agreed version of the Concept of Operations extending to 2020. A second iteration will be developed during 2011.	Enhanced ANSP coordination on long-term Operational Concept planning.
ADWG-10	Enhanced Night Time Overflight Routes	Completed in Dec 2009 (London UIR) and Mar 2010 (Scottish UIR)	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-11	Use of Operational Research Techniques to Design Fuel Efficient Organised Track Structures	Report completed in Qtr 3 2011; now assessing customer engagement options	If introduced, this would provide more efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles
ADWG-12	Early Morning Arrival Management for London (Heathrow)	Completed in Dec 2009 via operational trial.	N/A
ADWG-13	Optimised Routing from the NAT to Continuous Descent Approach for MAN Arrivals	Completed in March 2011 following successful trial (full permanent procedure for flights crossing LIFFY between 2300 and 0630).	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-14 -	Reduced Longitudinal Separation on NAT	Transferred to SPWG for management – see SPWG-13	N/A
ADWG-15	Deliver Plans for Long Term Operations at TMAs within the FAB maximising efficiency of design	This project has been refocused to deal with more strategic design considerations and the application of generic design principles enabling their application at multiple TMAs. This also involves supporting the joint NSAs on their work on Common Transition Altitude (CTA) and Performance Based Navigation (PBN).	This will enhance the provision of safe, cost effective and efficient ATM
ADWG-16	Dublin TMA Development	Project on track for completion in December 2012 with the introduction of Point Merge at Dublin Airport and co-incidental new early morning routes from Dublin	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2

Ref Code	Ref Name	Project Status	Qualitative Benefits
		eastbound across the NWMTA.	
ADWG-17	Convergence of ESSIP/LSSIP	Project completed as the process for convergence of ESSIP/LSSIP is agreed and treated as an ongoing activity within the FAB.	Enhanced ANSP coordination on formal reporting.
ADWG-18	DUB-LTMA city pair route optimisation	Transferred to Opportunities Register: Many other FAB projects are optimising routes into and out of Dublin.	N/A
ADWG-19(O)	Optimised cross-FIR FUA	The project is being managed and coordinated by the Irish and UK Military authorities. Work is underway to assess a proposal from the UK MoD to re-orientate and extend westwards, EGD201 Danger Area to traverse the FIR boundary. The initial deliverable is to identify enablers at the State level to establish a cross-FIR boundary Danger Area.	Better utilisation of airspace through increased flexible usage and making existing routes more accessible.
ADWG-21(O)	FAB High level sectors	Project on track for completion in December 2012 through an agreed 'Airspace Concept Proposal'. TEN-T funding was obtained to facilitate the feasibility study; the fund awarded to the UK-Ireland FAB amounting to €1.15m.	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-22(O)	Enhanced Fuel Saving Routes (Next phase)	Initial phase completed via the introduction of numerous NTFSRs during 2009/10 (see ADWG-10). The prefix 'NT' was dropped to reflect the opportunities as Fuel Saving Routes in general. Additional FSRs continue to be introduced.	More efficient user profiles delivering customer savings in terms of Fuel, CO2, track miles: see section 4.2
ADWG-23(O)	Early morning routes across NWMTA	Project on track for completion in November 2012; project is now subsumed into ADWG-16 Dublin TMA Development.	N/A
ADWG-24	AIM	Work underway to integrate the delivery of AIM across the FAB.	Enhanced ANSP coordination on AIM and better use of shared resources.

Ref Code	Ref Name	Project Status	Qualitative Benefits
Technology Coordination Group (TCG)			
TCG-1	Line connectivity project	Due for completion in 2011: ANSP savings through single contract.	ANSP Savings (€250,000 p.a.)
TCG-2	Datalink infrastructure (ARINC/SITA)	Potential ANSP savings through a joint approach in the implementation of VDL Mode 2 infrastructure to support the Data linking Mandate planned for 2013	The NATS and IAA datalink implementation projects will seek to deliver best value to the FAB in the provision of the infrastructure.
TCG-3	8.33Khz spacing below FL195	NATS and IAA will align their strategic plans for the introduction of 8.33KHz spacing	Service benefit through greater availability of VHF channels.
TCG-4	Surveillance / Radar data sharing	Project assessing potential sharing of surveillance data and surveillance infrastructure within the FAB	Reduction in costs of surveillance provision to both ANSPs and improved resilience in surveillance coverage
TCG-5	CCAMS	Project involves adopting a joint approach to testing and validating of CCAMS	Overall level of testing and validation of CCAMS in the UK and Ireland is less than if tested separately
TCG-6	Potential for FAB wide infrastructure services	Project assessing the potential to provide services on a FAB-wide basis (e.g. AFTN/AHMS, VOLMET), reducing the amount of technical infrastructure needed to supply them.	Cost savings for the FAB through a reduction in the amount of technical infrastructure needed to supply IAA and NATS aviation services.
TCG-7	Navigation Rationalisation Study (SESAR 15.3.2)	One of the current activities of this SESAR work package is to understand and validate (by comparison) two simulation tools, the Eurocontrol DEMETER and a tool developed for ENAV. The rationalisation of VOR within the UK-IRELAND FAB is being used as the test scenario for the study.	Cost savings for the FAB through a reduction in the VOR navigation infrastructure required to support operations within the FIRs.

4.2. Quantitative Savings

The information contained in this section provides the first cornerstone for the FAB CBA, in terms of customer financial savings, resulting from operational projects implemented by the FAB.

Projects Assessed

A number of projects were identified which can be assessed on a quantitative basis as they are delivering enabled customer savings, with the objective of delivering optimum use of airspace. All of these projects have been implemented by the IAA and NATS on a FAB basis. The quantitative assessment required the examination of historic project data in terms of estimated fuel tonnes savings for each project. In the case of two projects (ENSURE and Fuel Saving Routes), it was feasible to also use distance savings in order to estimate the non-fuel direct cost savings (in terms of reduced maintenance, reduced crew, and reduced aircraft ownership costs), i.e. the estimated savings in reduced "Delay Costs Per Minute".

The savings data in the table below displays the consolidated savings from the following projects:

- ADWG-7 P600 airway: From May 2009 – Changed the P600 airway into a dual route.
- ADWG-8 ENSURE Project: From December 2009 – Near 'free route' airspace within the Shannon FIR; removal of ATS routes from Shannon Upper to allow direct routing and flight planning from entry point to exit planning (Note: Planned introduction in conjunction with NATS on a FAB basis in order to maximise the operational efficiencies).
- ADWG-10 (Night Time) Fuel Saving Routes [NTSFRs]: Various routes introduced from December 2009 – Flight plannable direct routes across Irish/UK airspace.
- ADWG-13 CDA into Manchester: From March 2010 – Continuous Descent Approach for early morning arrivals off the North Atlantic into Manchester TMA.
- ADWG- Reduced Longitudinal Separation on the NAT: From March 2011 – Longitudinal Separation on the North Atlantic Track structure for traffic exiting the NAT from 10 to 5 minutes (trial commenced in March 2011, and extended to March 2014)
- ADWG-16 Dublin TMA 2012 Development (Point Merge): From December 2012 – Systemised approach procedure for Dublin approach including Continuous Descent Approaches, maximum capacity usage of the single runway operation at Dublin, and maximise the departure rate for Dublin airport especially during the first rotation.

Two other significant projects which will deliver substantial customers savings, but upon which data quantification was not feasible at this time, include;

- Integrated UK-Ireland FAB Network Management, due for implementation by the end of March 2012, which will reduce customer delays.
- FAB High Level Sectors (TEN-T funded Feasibility Study); estimated enabled savings will be available after scheduled Real Time Simulations in 2012.

However, the cost associated with the development and implementation of these projects has been included in the CBA. In future years, the enabled savings will be identifiable and will be added to future iterations of the CBA; this will significantly add to the enabled savings available to customers.

Total enabled savings

The total estimated 'baseline' enabled savings from these projects is displayed in the table below. The FAB was established in July 2008 but no project delivered any direct savings until 2009. As it presently stands, it is estimated that in 2012, customers will save a total of €26.6m, including 25,000 tonnes of fuel, equivalent to €18.7m in fuel costs. Customers will also save over 80,000 tonnes of CO2, and €1.0m in reduced CO2 emissions (ETS) charges. Additional non-fuel savings (reduced maintenance, crew and aircraft ownership costs) are estimated at €6.8m.

Based on these projects alone, the baseline enabled annual savings by 2020 are estimated to reach €36.2m, including 35,000 tonnes of fuel and 111,000 tonnes of CO2.

In the baseline scenario, the total cumulative enabled savings from 2008-2020 amounts to €336.5m, including reduced fuel burn of 332,000 tonnes and reduced CO2 emissions of 1.06bn tonnes.

Baseline – Total Enabled Savings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Fuel Burn (t '000)	1	22	24	25	29	31	32	32	33	34	34	35	332
Fuel cost €m	€0.5	€12.0	€17.8	€18.7	€21.4	€23.0	€23.4	€24.0	€24.4	€24.9	€25.4	€25.9	€241.2
CO2 (t '000)	4	71	77	80	92	98	100	103	104	107	109	111	1,056
CO2 €m	N/A	N/A	N/A	€1.0	€1.3	€1.5	€1.6	€1.7	€1.9	€2.0	€2.2	€2.2	€15.4
Non-Fuel € ('000)	€0.0	€6.5	€6.7	€6.8	€7.0	€7.1	€7.3	€7.4	€7.5	€7.7	€7.9	€8.0	€79.9
Total €m	€0.5	€18.5	€24.5	€26.6	€29.6	€31.5	€32.3	€33.1	€33.8	€34.6	€35.4	€36.2	€336.5

Project Breakdown of enabled savings

The next table provides the enabled savings per project (baseline scenario):

Project	Baseline Measure	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
P600	Fuel Burn (t '000)	1.2	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1	22.4
	Fuel cost €m	€0.5	€0.9	€1.3	€1.3	€1.4	€1.4	€1.4	€1.5	€1.5	€1.5	€1.5	€1.6	€15.8
	CO2 (t '000)	3.8	5.5	5.7	5.7	5.9	6.0	6.1	6.2	6.3	6.5	6.6	6.8	71.1
	CO2 €m	N/A	N/A	N/A	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€1.0
	Total €m	€0.5	€0.9	€1.3	€1.4	€1.4	€1.5	€1.5	€1.6	€1.6	€1.6	€1.7	€1.7	€16.7
ENSURE Project*	Fuel Burn (t '000)	0.0	14.8	15.3	15.5	15.8	16.2	16.5	16.9	17.1	17.5	17.9	18.3	181.8
	Fuel cost €m	€0.0	€7.9	€11.2	€11.5	€11.7	€12.0	€12.2	€12.5	€12.7	€13.0	€13.3	€13.5	€131.7
	CO2 (t '000)	0.0	46.8	48.7	49.4	50.3	51.4	52.5	53.6	54.5	55.7	56.9	58.0	577.9
	CO2 €m	N/A	N/A	N/A	€0.6	€0.7	€0.8	€0.8	€0.9	€1.0	€1.1	€1.1	€1.2	€8.2
	Non-Fuel € ('000)	€0.0	€5.3	€5.5	€5.5	€5.6	€5.7	€5.9	€6.0	€6.1	€6.2	€6.4	€6.5	€64.7
	Total €m	€0.0	€13.2	€16.6	€17.7	€18.1	€18.5	€19.0	€19.4	€19.8	€20.3	€20.8	€21.2	€204.6
Fuel Saving Routes*	Fuel Burn (t '000)	0.0	5.7	5.9	6.0	6.1	6.2	6.4	6.5	6.6	6.7	6.9	7.0	70.0
	Fuel cost €m	€0.0	€3.1	€4.3	€4.4	€4.5	€4.6	€4.7	€4.8	€4.9	€5.0	€5.1	€5.2	€50.7
	CO2 (t '000)	0.0	18.1	18.8	19.0	19.4	19.8	20.2	20.7	21.0	21.4	21.9	22.4	222.6
	CO2 €m	N/A	N/A	N/A	€0.2	€0.3	€0.3	€0.3	€0.4	€0.4	€0.4	€0.4	€0.4	€3.2
	Non-Fuel € ('000)	€0.0	€1.2	€1.3	€1.3	€1.3	€1.4	€1.4	€1.4	€1.4	€1.5	€1.5	€1.5	€15.2
	Total €m	€0.0	€4.3	€5.6	€6.0	€6.1	€6.3	€6.4	€6.6	€6.7	€6.9	€7.0	€7.2	€69.1
CDA into MAN	Fuel Burn (t '000)	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.4
	Fuel cost €m	€0.0	€0.1	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€1.8
	CO2 (t '000)	0.0	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	7.7
	CO2 €m	N/A	N/A	N/A	€0.0	€0.0	€0.0	€0.0	€0.0	€0.0	€0.0	€0.0	€0.0	€0.1
	Total €m	€0.0	€0.1	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€0.2	€1.9
Reduced Long. Separat.	Fuel Burn (t '000)	0.0	0.0	1.1	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.6	1.6	14.5
	Fuel cost €m	€0.0	€0.0	€0.8	€1.0	€1.0	€1.1	€1.1	€1.1	€1.1	€1.1	€1.2	€1.2	€10.7
	CO2 (t '000)	0.0	0.0	3.6	4.4	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	46.1
	CO2 €m	N/A	N/A	N/A	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.1	€0.7
	Total €m	€0.0	€0.0	€0.8	€1.1	€1.1	€1.1	€1.2	€1.2	€1.2	€1.2	€1.3	€1.3	€11.5
Dublin TMA Development	Fuel Burn (t '000)	0.0	0.0	0.0	0.3	3.4	5.0	5.1	5.2	5.3	5.4	5.5	5.7	41.0
	Fuel cost €m	€0.0	€0.0	€0.0	€0.2	€2.6	€3.7	€3.8	€3.9	€3.9	€4.0	€4.1	€4.2	€30.5
	CO2 (t '000)	0.0	0.0	0.0	0.9	10.9	15.9	16.3	16.6	16.9	17.3	17.6	18.0	130.5
	CO2 €m	N/A	N/A	N/A	€0.0	€0.2	€0.2	€0.3	€0.3	€0.3	€0.3	€0.4	€0.4	€2.3
	Total €m	€0.0	€0.0	€0.0	€0.2	€2.7	€4.0	€4.1	€4.2	€4.3	€4.4	€4.5	€4.6	€32.8

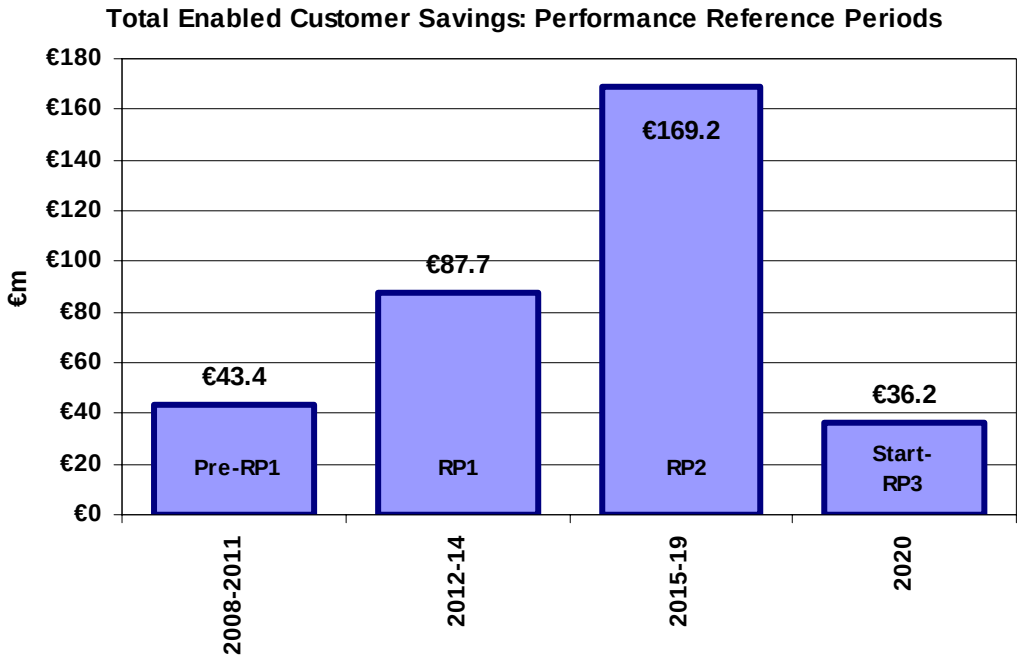
*Analysis of estimated 'Non-fuel costs' was feasible for these projects [see section 3.4(f) for methodology]

Enabled savings and the Performance scheme

The UK-Ireland FAB is actively engaged in preparations for Reference Period 2 (RP2) from 2015 onwards. Therefore, it was deemed useful* to examine the estimated enabled savings from the FAB during the specific performance scheme reference periods.

Returning to the baseline scenario, the table below presents the total enabled savings prior to RP1 (2008-11), followed by RP1 (2012-14), then RP2 (2015-19) and 2020 is also shown for completion purposes:

Total Enabled Savings Baseline	Pre-RP1	RP1	RP2	RP3…..	2009-2020
	2008-2011	2012-14	2015-19	2020	Total
Fuel Burn t ('000)	48	85	164	35	332
Fuel cost € ('000)	€30.2	€63.0	€122.0	€25.9	€241.2
CO2 t ('000)	152	270	523	111	1,056
CO2 € ('000)	€0.0	€3.8	€9.4	€2.2	€15.4
Non-fuel € ('000)	€13.2	€20.9	€37.8	€8.0	€79.9
Total Saved € ('000)	**€43.4**	**€87.7**	**€169.2**	**€36.2**	**€336.5**



(*Note: This data has not been linked directly with either the Irish or UK National Performance Plans for RP1, and should not be interpreted in that way – it has been provided in this CBA purely for illustrative purposes.)

5. FAB Costs

The information contained in this section provides the second cornerstone for the FAB CBA, in terms of ANSP investment and operating costs for the FAB.

The cost data comprises of two main headings:

- Labour unit costs: operating costs associated with the day-to-day implementation of the FAB (general FAB project management / governance costs) or operating costs for the implementation of a specific project, i.e. ANSP labour man-day costs, and

- Investment costs: for the implementation of a specific project.

Together, the total costs for the annual implementation of the FAB can be estimated for the ANSPs on the basis of existing FAB projects and the expected FAB management volume.

Labour unit costs: Costs were estimated for generic FAB governance and generic project management costs within the ANSPs, i.e. Opex component. The majority of personal involved in the FAB are "Operational" staff, i.e. not Admin or Engineering. Therefore, the average Air Traffic Control Officer (ATCO) salary costs within the ANSPs, forms the basis of the unit labour costs.

ANSP Opex and Capex (for project which have specified budgets): A number of FAB projects also contain specific budgets, which were assessed as follows;

- Identify Opex and Capex.
- Identify Travel/Subsistence.
- Identify specified labour days.
- Identify 'Other' or 'third-party' costs, and
- The cost-schedule must specify the year in which the costs were incurred for each project.

It was essential that any potential duplication of costs was avoided, i.e. ensure that generic governance / project management costs were separated from any project with the specified budget.

From 2008 – 2011, the estimated ANSP costs associated with the FAB are €9.4m.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
ANSP Costs (€m)	€0.9	€2.9	€3.6	€2.0	€3.1	€0.9	€0.9	€1.0	€1.0	€1.0	€1.0	€1.0	€1.0	€20.3

Calculations were developed to support this assessment process [Undisclosed due to the commercial sensitive nature of the data.].

6. Financial Assessment

6.1. Net Present Value Result

The discount rate for the CBA is 7.25%, which is an average for the discount rate for the IAA and NATS.

Taking account of the estimated customer savings (section 4.2) and the estimated ANSP costs (Section 5), the baseline scenario confirms that the FAB will deliver an overall positive financial result, with a Net Present Value of €176.1m by 2020.

Baseline Traffic: Cash Flow and Net Present Value (NPV)

Year 1	Actual Year	Cash Flow €m (in terms of customer Fuel/ETS Savings)	ANSP Costs	Net Cash Flow (Customer Savings less ANSP Costs)	Discounted Cash Flow €m
1	2008	€0.0	€0.9	-€0.9	-€0.8
2	2009	€0.5	€2.9	-€2.5	-€2.1
3	2010	€18.5	€3.6	€14.9	€12.1
4	2011	€24.5	€2.0	€22.5	€17.0
5	2012	€26.6	€3.1	€23.4	€16.5
6	2013	€29.6	€0.9	€28.7	€18.9
7	2014	€31.5	€0.9	€30.6	€18.7
8	2015	€32.3	€1.0	€31.3	€17.9
9	2016	€33.1	€1.0	€32.1	€17.1
10	2017	€33.8	€1.0	€32.8	€16.3
11	2018	€34.6	€1.0	€33.6	€15.6
12	2019	€35.4	€1.0	€34.4	€14.9
13	2020	€36.2	€1.0	€35.2	€14.2
Totals		€336.5	€20.3	€316.3	€176.1
				Overall NPV	**€176.1**

6.2. Sensitivity / Variability

The CBA has assessed variability in the cash flow and NPV in terms of two* areas, namely fuel and traffic variations, on the basis that these key drivers have the most significant impact:

- **Traffic variations from 2011 – 2020**, as per the forecasts published for the low, baseline and High case traffic scenarios in the EUROCONTROL Medium-Term Forecast Flight Movements 2011-17, 24th October 2011.

- **Fuel price fluctuations** on the cost p/tonne from 2012 onwards:

From 2012	Low	Base	High
Fuel Cost p/tonne:	€631.00	€742.35	€853.70
% Variance	-15%		+15%

(*Note: Other potential variables have not been accounted for, on the assumption that their impact on the model is deemed to be significantly lower in relative terms to the impact of fuel and traffic variations.)

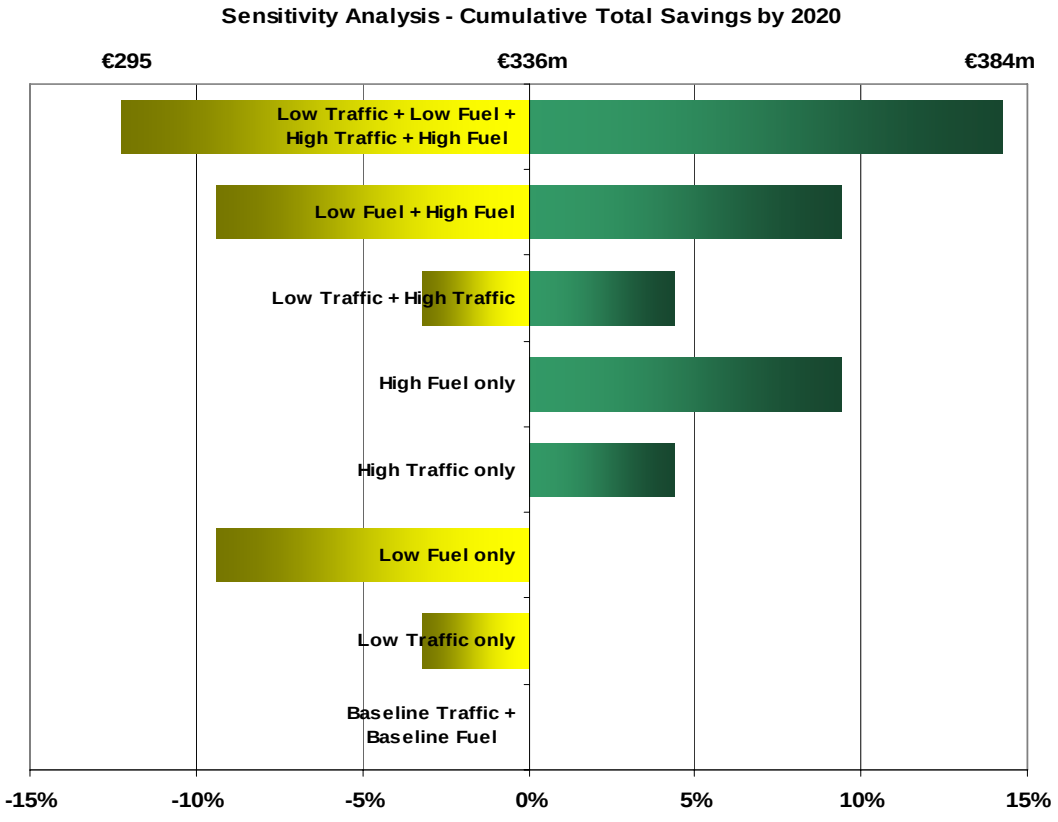
- These two areas were also merged to establish the following seven possible scenarios in various combinations:

1. Low traffic + Low Fuel
2. Low Fuel
3. Low Traffic
4. **Baseline Traffic + Baseline Fuel**
5. High Traffic
6. High Fuel
7. High Traffic + High Fuel

Sensitivity Analysis

Taking account of variation in these two these key drivers, the total cumulative enabled savings to customers by 2020 varies as follows;

- Low traffic + low Fuel: -12% below baseline (€295m)
- Baseline: €336m
- High traffic + High Fuel: +14% above baseline (€384m)



On the basis of these variability assumptions, the total aggregated estimated enabled savings and NPV for the period 2008-2020 differs as follows:

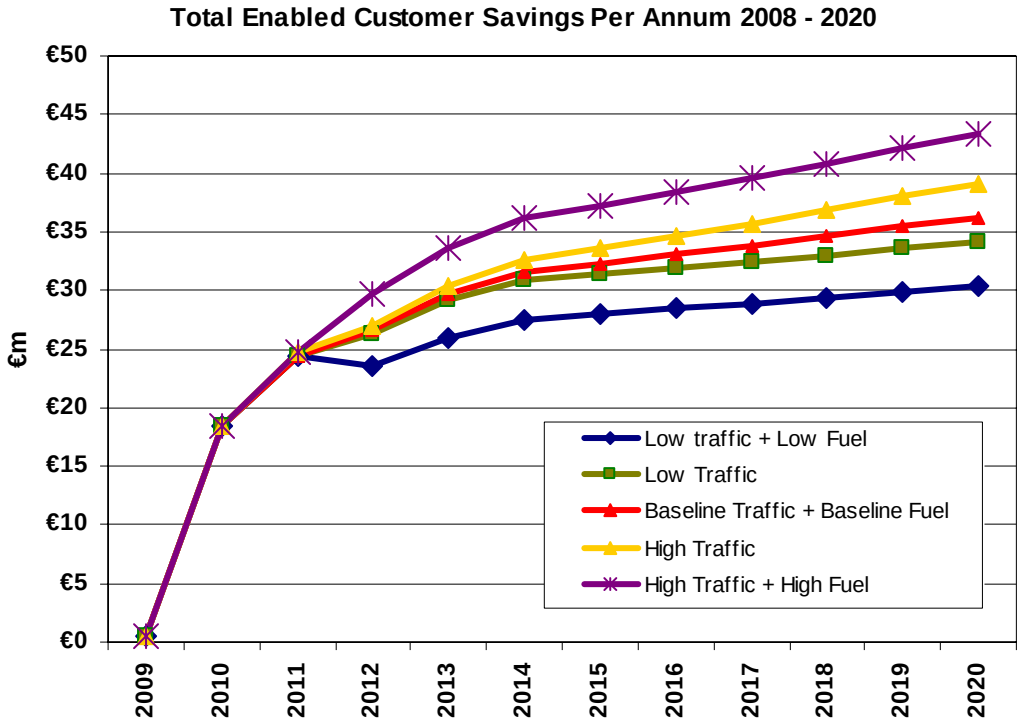
2008 - 2020 Estimated Enabled Savings	Low traffic + Low Fuel	Low Traffic	*Baseline Traffic + Baseline Fuel*	High Traffic	High Traffic + High Fuel
Fuel Burn t ('000)	322	322	***332***	346	346
Fuel cost € ('000)	€202.9	€233.4	***€241.2***	€251.7	€284.9
CO2 (t)	1,023	1,023	***1,056***	1,101	1,101
CO2 € ('000)	€14.9	€14.9	***€15.4***	€16.3	€16.3
Non-fuel € ('000)	€77.4	€77.4	***€79.9***	€83.3	€83.3
Total Saved € ('000)	€295.2	€325.7	***€336.5***	€351.2	€384.4
Total Costs € ('000)	€20.3	€20.3	***€20.3***	€20.3	€20.3
NPV €m	**€154.4**	**€170.7**	***€176.1***	**€183.4**	**€201.0**

On the basis of these variability assumptions, the annual total customer enabled savings by 2020, ranges from €30.4m in 2020 (low-low); €36.2m (baseline); to €43.3m (high-high), as illustrated in the table and chart below:

Scenario	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Low traffic + Low Fuel	€0.5	€18.5	€24.3	€23.5	€26.0	€27.5	€27.9	€28.5	€28.9	€29.4	€29.9	€30.4	€295.2
Low Fuel	€0.5	€18.5	€24.5	€23.8	€26.4	€28.1	€28.8	€29.5	€30.1	€30.9	€31.6	€32.3	€304.9
Low Traffic	€0.5	€18.5	€24.3	€26.3	€29.1	€30.8	€31.3	€31.9	€32.4	€33.0	€33.6	€34.1	€325.7
Baseline Traffic + Baseline Fuel	€0.5	€18.5	€24.5	€26.6	€29.6	€31.5	€32.3	€33.1	€33.8	€34.6	€35.4	€36.2	€336.5
High Traffic	€0.5	€18.5	€24.7	€26.9	€30.3	€32.6	€33.6	€34.7	€35.7	€36.8	€38.0	€39.1	€351.2
High Fuel	€0.5	€18.5	€24.5	€29.4	€32.8	€35.0	€35.8	€36.7	€37.4	€38.3	€39.2	€40.1	€368.2
High Traffic + High Fuel	€0.5	€18.5	€24.7	€29.7	€33.6	€36.1	€37.2	€38.4	€39.5	€40.8	€42.1	€43.3	€384.4

Risks

All projects have already been implemented, or will be in the near future. Therefore, the primary risk/uncertainties relate to changes in traffic and fuel costs in the future. Based on the inputs used for these assumptions the ANSPs are satisfied that there is a reasonable degree of confidence in the CBA output.



7. Environmental impact

In the original May 2008 proposal document, the ANSPs set out five headline goals for the FAB. One of those goals was to deliver *"environmental benefits through the development of environmentally efficient routes for both oceanic and TMAs"*. Delivery this goal has therefore been at the forefront of the FAB since it was established.

As a direct result of the projects implemented by the FAB so far, or in the near future, customers have or will benefit from access to more optimal routings, as result of;

- Free route airspace
- Longer direct routings
- Continuous Decent Approaches
- Greater airspace user flight planning flexibility
- Cross-FIR airway enhancements

Section 4.2 presented the consolidated savings from projects implemented to-date or in the near future, in terms of reduced fuel burn, reduced CO2 and their monetary equivalents. The table below extracts this information:

Baseline – Total Enabled Savings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Fuel Burn (t '000)	1	22	24	25	29	31	32	32	33	34	34	35	332
CO2 (t '000)	4	71	77	80	92	98	100	103	104	107	109	111	1,056

During the period 2008-2020, existing projects (not accounting for any potential future unplanned implementation projects), will save airspace customers approximately 332,000 tonnes of fuel and 1.06 billion tonnes of CO2 emissions. More projects will be identified which will further increase these substantial environmental savings, e.g. the implementation of UK-Ireland FAB Network Management, and FAB High Level Sectors.

8. Dependencies

Taking account of the guidance set-out in the FAB Guidance Material under "Dependencies", the following table cross-checks the FAB against a number of key requirements set out under Article 9a(2) of the Service Provision Regulation (EC 550/2004), as well as some other expectation; as follows

Dependency	UK-Ireland FAB Support
Optimum airspace utilisation (section 7.4.3/ check-list item 4.3)	(A) A number of projects have already been implemented (or will be introduced by Qtr 2 2012) which aim to support the optimisation of airspace utilisation: ▪ Regional FAB network management (by the beginning of April 2012): The airspace will be treated as one continuum between Dublin, Shannon, Swanwick and Prestwick ACCs, and will deal with both the tactical and the pre-tactical / strategic aspects. Technical hardware systems are being put in place to share information and decision making processes between the ACCs. ▪ 8-week strategic brief (since September 2010): Joint publication by the IAA and NATS to air operators which provides more effective short-term coordination. ▪ Daily FAB Pre-tactical network brief (since April 2010): Joint publication by the IAA and NATS to air operators which allows airlines to identify the most efficient routes and plan more direct routes. ▪ Civil/Military coordination: The LARA tool is being introduced to the FAB to deliver enhanced civil/Military coordination and provide for a more efficient use of the whole airspace for all airspace users. The costs associated with all of the above projects have been accounted for within the CBA. These projects will deliver enabled savings to customers but the estimated savings are not directly quantifiable.

Dependency	UK-Ireland FAB Support
	(B) A number of projects, previously outlined in this CBA, are directly supporting the optimisation of airspace utilisation, as follows: ▪ ENSURE – near 'free route' within the Shannon FIR ▪ (Night Time) Fuel Saving Routes – Flight plannable direct routings across the whole of the FAB airspace. ▪ High Level Sectors (HLS) Concept – This feasibility study, due for completion in December 2012, is aiming to secure an agreed concept for FAB high level sectors in the future, including possible cross-FIR sectors for high level airspace. The costs and savings associated with ENSURE and Fuel Saving Routes have been accounted for within the CBA. Costs associated with HLS have also been included but the project is not sufficiently mature to provide an estimate of the future enabled savings.
Consistency with the European route network (section 7.4.4/ check-list item 4.4)	As mentioned above, regional FAB network management will be implemented by the beginning of April 2012. This will be fully consistent with the new European network management function. As is currently stands, the UK-Ireland FAB is working closely with the Network Manager to consider options feasible in relation to flow management, airspace management and capacity management. Furthermore, the UK-Ireland FAB is jointly represented on the Network Management Board by the Managing Director of NERL. Additionally, we are taking a FAB approach to the cooperative decision making processes of the Network Management Function by coordinating our input and attendance at the Eurocontrol expert teams that will support the NMF consultation arrangements.
The smooth and flexible transfer of responsibility for ATC (section 7.4.6/ check-list item 4.6),	To demonstrate that the transfer of responsibility for ATC is smooth and flexible; ▪ A description of the arrangements for cross border provision of air traffic services has been provided in the original FAB proposal (see Appendix A, page 39, section 2.2.3, Letters of Agreement). ▪ New procedures are planned for FAB network management (see above). ▪ Civil/Military arrangements will be enhanced through the FAB implementation of the LARA tool.

Dependency	UK-Ireland FAB Support
	▪ The Irish and UK LSSIPs make full reference to all coordination procedures between concerned adjacent air traffic service providers (see section 3.2.5 of the main document).
Compatibility of airspace configurations and optimisation of airspace structures (7.4.7/ check-list item 4.7)	The FAB is also engaged in the following; ▪ FAB Common Transition Altitude: The Irish and UK Regulators are working to implement revised arrangements to harmonise the Transition Altitude by Winter 2013/14. ▪ Performance Based Navigation: joint policy agreed in Oct 2011, following a consultation with industry and other stakeholders for implementation across the FAB. ▪ Standardised European Rules of the Air (SERA): Fully engaged with the Commission, EASA and EUROCONTROL on the development of the draft SERA Regulations.
Setting national or FAB level performance plans and targets consistent with the EU-wide performance targets (section 7.4.10/ check-list item 4.10)	Ireland and the UK elected to produce separate national performance plans for Reference Period 1 along with the required aggregated FAB plan. However there has been a significant level of cooperation which has taken place in the development of the National Plans. Both NSAs have worked together extensively to produce the national plans including coordination of stakeholder consultation activities. A joint ANSP/NSA "Performance Advisory Group" was established to support this coordination process (and illustrated in Section 2.3 Governance of the main document). Furthermore, the two States have plans to produce a common FAB Performance Plan for RP2 (2015-2018) and have commenced scoping work for this activity.
Optimising the use of technical resources	CNS collaboration is actively being pursued through the FAB. The table presented in section 4.1. outlines the expected benefits associated with a number of TCG (Technology Coordination Group) projects, including: ▪ Line connectivity ▪ Datalink infrastructure (ARINC/SITA) ▪ 8.33Khz spacing below FL195 ▪ Surveillance / Radar data sharing ▪ CCAMS ▪ Potential for FAB wide infrastructure services ▪ Navigation Rationalisation Study (SESAR 15.3.2) Technical systems are also being put in place to support FAB network management.

Dependency	UK-Ireland FAB Support
	Although, there are no plans at present to engage in joint procurement of ATM systems due to long-term CapEx programmes in place within IAA and NATS, both ANSPs have secured ATM system cost savings through inter-ANSP cooperation with other ANSPs in European, as follows; ▪ IAA: ATM cost savings through COOPANS, which is supporting the DK-SE FAB. ▪ NATS: ATM cost savings through iTech, which is supporting the South West FAB.
Optimising the use of human resources	Duplications of a number of activities have (or will in the future) been rationalised in a number of support services. Project examples include; ▪ Development and publication of the 8-week strategic brief (since September 2010). ▪ Development and publication of the Daily FAB Pre-tactical network brief (since April 2010). ▪ Integration of AIM services between Ireland and the UK (planned for 2012). ▪ Network Management will rationalise the interface with the CFMU and Network Manager, i.e. just one interface will be required. Further to the above examples, it is anticipated that the implementation of network management could assist in terms of minimising the potential impact of staff shortages across the whole FAB airspace. It is also anticipated that the concept agreed for the FAB High Level Sector feasibility study could also assist in optimising the use of human resources across FAB Upper airspace sectors.

9. Stakeholder impact and consultation

9.1. Stakeholder participation in this CBA:

The UK-IRELAND FAB has a robust governance structure, which includes a direct role for airline and military representation on the ANSP FAB Management Board (FMB). Both of these stakeholders review plans and projects on an ongoing basis and participate in the decision making process. The FAB Plan containing the projects for implementation each year is signed-off by the FMB, confirming their direct role in the validation of priority areas.

Airline representatives function as the Co-Chairs of the Service Provision Working Group (SPWG), with a seat on the FMB. Furthermore, customer consultation was enhanced in 2010, with the first joint CEO/Customer Forum, which secured views and options in relation to the current FAB Plan.

In relation to this CBA, information was secured directly from the SPWG Co-Chairs (airline representation) to strengthen the data model during the design-phase, and inputs were sourced and secured from the MIL.

Furthermore, draft CBA was presented to the airline community at the second joint CEO/Customer Forum on the 7th December 2011, as part of the consultation and verification process. A copy was made available through both the IAA and NATS online security restricted customer websites from the 7th – 21st December. (Note: No changes were required to be made to the CBA as no feedback was provided by customers during the consultation phase.)

9.2. Military Impact:

The Irish and UK military authorities are an integral part of the UK-Ireland FAB. They have been involved in the governance structure and decision making process, since the FAB was implemented in June 2008, having representatives on the ANSP FAB Management Board. Furthermore, the Irish and UK Military authorities are involved in the implementation of projects which necessitate closer civil-military cooperation, as well as cross-FIR projects to support FUA at a FAB level.

9.3. Airlines benefits:

The benefits of the FAB to customers to-date is significant and the CBA has illustrated this both in quantitative and qualitative terms. As a result of existing and future projects, customers benefit from the following;

- Reduced fuel burn and associated cost savings,
- Reduced CO2 emissions and associated cost savings,
- Enhanced operational safety at a FAB level,
- More effective communication mechanisms through single FAB referral publications,

- Reduced delays,
- Enhanced operational pre-tactical flight planning, and
- More optimal flight profiles (free route, longer direct routings, CDAs, etc).

The positive impact on customers in terms of financial savings is clearly illustrated in section 4.2 of the CBA.

9.4. ANSP benefits:

The underlying advantage of the UK-Ireland operational FAB is the fact that it is ensuring the close cooperation and business integration (from an operational perspective) of the IAA and NATS, which enables the ANSPs to meet the requirements outlined in the performance scheme in the years to come, engage fully with the Network Manager and deliver cost-efficiency measures. Coordination and harmonisation is occurring across all levels and is gaining momentum as the FAB matures.

10. Summary position:

In summary, due to the operational nature of the UK-Ireland FAB, the aim of the CBA is to analyse and estimate:

- the 'benefits', in terms of enabled financial and environmental savings to airspace customers, as a result of operational projects implemented by the FAB, and
- the 'costs' in terms ANSP investment and operating costs for the FAB.

The primary objective of this analysis is to show if the enabled savings secured by customers as a result of the operational projects implemented by the FAB, exceed the ANSP implementation and operating costs, and if this shows a positive Net Present Value (NPV).

NPV Result and enabled customer savings

The resulting CBA has confirmed that the FAB delivers an overall positive NPV of €176.1m by 2020 (baseline scenario). On the basis of the CBA sensitivity analysis performed, the total aggregated estimated enabled savings and NPV for the period 2008-2020 differ as follows:

2008 - 2020 Estimated Enabled Savings	**Low traffic + Low Fuel**	**Low Traffic**	***Baseline Traffic + Baseline Fuel***	**High Traffic**	**High Traffic + High Fuel**
Fuel Burn t ('000)	322	322	***332***	346	346
Fuel cost € ('000)	€202.9	€233.4	***€241.2***	€251.7	€284.9
CO2 (t)	1,023	1,023	***1,056***	1,101	1,101
CO2 € ('000)	€14.9	€14.9	***€15.4***	€16.3	€16.3
Non-fuel € ('000)	€77.4	€77.4	***€79.9***	€83.3	€83.3
Total Saved € ('000)	€295.2	€325.7	***€336.5***	€351.2	€384.4
Total Costs € ('000)	€20.3	€20.3	***€20.3***	€20.3	€20.3
NPV €m	**€154.4**	**€170.7**	***€176.1***	**€183.4**	**€201.0**

The total estimated 'baseline' enabled savings per annum are displayed in the table below. The FAB was established in July 2008 but no project delivered any direct savings until 2009. As it presently stands, it is estimated that in 2012, total enabled customer savings will be €26.6m, including 25,000 tonnes of fuel, equivalent to €18.7m in fuel costs. Customers will also save over 80,000 tonnes of CO2, and €1.0m in reduced CO2 emissions (ETS) charges. Additional non-fuel savings (reduced maintenance, crew and aircraft ownership costs) are estimated at €6.8m.

Based on these projects alone (and not accounting for additional projects which are not currently planned for in the future), the baseline enabled annual savings by 2020 are estimated to reach €36.2m, including 35,000 tonnes of fuel and 111,000 tonnes of CO2.

In the baseline scenario, the total cumulative enabled savings from 2008-2020 amounts to €336.5m, including reduced fuel burn of 332,000 tonnes and reduced CO2 emissions of 1.06bn tonnes.

Baseline – Total Enabled Savings	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Fuel Burn (t '000)	1	22	24	25	29	31	32	32	33	34	34	35	332
Fuel cost €m	€0.5	€12.0	€17.8	€18.7	€21.4	€23.0	€23.4	€24.0	€24.4	€24.9	€25.4	€25.9	€241.2
CO2 (t '000)	4	71	77	80	92	98	100	103	104	107	109	111	1,056
CO2 €m	N/A	N/A	N/A	€1.0	€1.3	€1.5	€1.6	€1.7	€1.9	€2.0	€2.2	€2.2	€15.4
Non-Fuel € ('000)	€0.0	€6.5	€6.7	€6.8	€7.0	€7.1	€7.3	€7.4	€7.5	€7.7	€7.9	€8.0	€79.9
Total €m	€0.5	€18.5	€24.5	€26.6	€29.6	€31.5	€32.3	€33.1	€33.8	€34.6	€35.4	€36.2	€336.5

Qualitative benefits

Further to the above, the FAB has also implemented a number of projects which have or will deliver substantial qualitative benefits. These benefits are absolutely critical in terms of their positive contribution to the FAB and benefits to all stakeholders (to the ANSPs and to the MIL and Civil airspace users). It is essential to take these qualitative benefits into consideration as part of the consolidated CBA assessment process. For the most part, the primary qualitative benefits relate to;

- Enhanced safety and safety harmonisation,
- More effective tactical and strategic planning between the ANSPs,
- More efficient network management,
- Enhanced coordination on airspace design and cross-FIR airspace management, and
- Collaborative Technical opportunities and SESAR alignment.

FAB and the impact on 'dependencies'

The FAB also supports a significant number of dependences, as follows

Dependency	UK-Ireland FAB Support (Highlights only)
Optimum airspace utilisation	*Procedures / Process:* ▪ Regional FAB network management (by the beginning of April 2012) ▪ 8-week strategic brief (since September 2010) ▪ Daily FAB Pre-tactical network brief (since April 2010): ▪ Civil/Military coordination: LARA tool

Dependency	UK-Ireland FAB Support (Highlights only)
	Projects delivering direct enabled savings: ▪ ENSURE – near 'free route' within the Shannon FIR ▪ (Night Time) Fuel Saving Routes – Flight plannable direct routings across the whole of the FAB airspace. ▪ High Level Sectors (HLS) Concept - feasibility study to secure an agreed concept for FAB high level sectors.
Consistency with the European route network	▪ FAB network management will be fully consistent with the new European network management function. ▪ FAB is working closely with the Network Manager to consider options feasible in relation to flow management, airspace management and capacity management. ▪ FAB is jointly represented on the Network Management Board by the Managing Director of NERL. ▪ Coordinating our input and attendance at the Eurocontrol expert teams that will support NMF consultation.
Smooth and flexible transfer of responsibility for ATC	▪ Letters of Agreement provided for cross border provision of air traffic services. ▪ New procedures are planned for FAB network management. ▪ Civil/Military arrangements will be enhanced through LARA. ▪ The Irish and UK LSSIPs make full reference to all coordination procedures between concerned adjacent air traffic service providers
Compatibility of airspace configurations and optimisation of airspace structures	▪ FAB Common Transition Altitude: by Winter 2013/14. ▪ Performance Based Navigation: joint policy agreed in Oct 2011. ▪ Standardised European Rules of the Air (SERA): Fully engaged with the Commission, EASA and EUROCONTROL.
Setting national or FAB level performance plans and targets consistent with the EU-wide performance targets	▪ Separate national performance plans for RP1 but with a significant level of cooperation, including coordination of stakeholder consultation activities. ▪ Joint ANSP/NSA "Performance Advisory Group" ▪ Plans to produce a common FAB Performance Plan for RP2 (2015-2018) and have begun work to scope the options and what detailed is required to deliver this.
Optimising the use of technical resources	▪ Technology collaboration is actively being pursued through the FAB (7 current projects). ▪ Technical systems are also being put in place to support FAB network management. ▪ ATM system cost savings secured through inter-ANSP cooperation with other ANSPs in European, as follows; ▪ IAA: COOPANS, supporting the DK-SE FAB.

Dependency	UK-Ireland FAB Support (Highlights only)
	▪ NATS: iTech, supporting the South West FAB.
Optimising the use of human resources	▪ Duplications of a number activities have (or will in the future) been rationalised in a number of support services, e.g. operational planning publications. ▪ Network management could assist in terms of minimising the potential impact of staff shortages. ▪ FAB High Level Sector feasibility study could also assist in optimising the use of human resources across FAB Upper airspace sectors.

Summary cross-check table

Further to the above, the following table provides a cross-check of the CBA against the FAB IR CBA specific requirements.

FAB IR Annex Part II, 4, requirements	Compliance Statement
(a) the cost-benefit analysis was conducted according to industry standard practice, using among others discounted cash flow analysis;	To ensure that that the methodology and approach was conducted according to industry standard practice, draft material for this CBA was examined by qualified experts within the IAA and NATS. This information was used to refine the CBA model on the basis of collective expert assessments. Furthermore, on behalf of the FAB, the IAA contracted KPMG to conduct an external review based on the following terms: • *"review the CBA Report for the UK-Ireland FAB to consider if:* *(a) it was conducted according to industry standard practice as stated in the CBA guidance contained in the EUROCONTROL document "D06-06 - ATM CBA for Beginners – Edition 00.01.00" provided to KPMG by the Client; and* *(b) it broadly follows the European Commission Guidence material as advised to us by the Client (i.e. as per the following link http://www.skybrary.aero/index.php/7.4.05_Cost-benefit_analyses)* *For the avoidance of doubt KPMG will not consider the specific inputs into the FAB CBA and will give no opinion in this regard;* • *review the underlying financial model ("the Model") and report to you on whether, in our opinion:*

FAB IR Annex Part II, 4, requirements	Compliance Statement
	▫ *so far as its mechanical construction is concerned, it has been constructed appropriately so as to achieve the objectives which it was designed to meet; and* ▫ *the calculations in the model are arithmetically correct.* *Our work in respect of the Model will be limited to the matters set out above and accordingly will not include, for the avoidance of doubt, any form of review of:* ▫ *the commercial merits or technical feasibility;* ▫ *the factual accuracy of the input data and the validity or reasonableness of the underlying assumptions; or* ▫ *the key accounting or tax assumptions used in the Model and accordingly we will express no opinion thereon."* Please see Appendix J, KPMG Letter to IAA concerning the UK-Ireland FAB CBA.
(b) the cost-benefit analysis provides a consolidated view of the impact of the establishment or modification of the functional airspace block on the civil and military airspace users;	A consolidated view confirms the ANSPs, the airlines and the military benefit from the FAB. On a specific stakeholder basis; **Customers:** As it presently stands, it is estimated that in 2012, total enabled customer savings will be €26.6m, including 25,000 tonnes of fuel, equivalent to €18.7m in fuel costs. Customers will also save over 80,000 tonnes of CO2, and €1.0m in reduced CO2 emissions (ETS) charges. Additional non-fuel savings (reduced maintenance, crew and aircraft ownership costs) are estimated at €6.8m. Based on these projects alone (and not accounting for additional projects which are not currently planned for in the future), the baseline savings by 2020 are estimated to reach €36.2m, including 35,000 tonnes of fuel and 111,000 tonnes of CO2. **MIL:** The Irish and UK military authorities are an integral part of the UK-Ireland FAB and are actively involved in the implementation of projects which necessitate closer civil-military cooperation, as well as cross-FIR projects to support FUA at a FAB level. Furthermore, the FAB has also implemented a number of projects which are or will deliver substantial qualitative benefits. These benefits are absolutely critical in terms of their positive contribution to the FAB and the benefits to all stakeholders (to the ANSPs and

FAB IR Annex Part II, 4, requirements	Compliance Statement
	to the MIL and Civil airspace users). It is essential to take these qualitative benefits into consideration as part of the consolidated CBA assessment process.
(c) the cost-benefit analysis demonstrates an overall positive financial result (net present value and/or internal rate of return) for the establishment or modification of the functional airspace block;	The primary objective of this analysis is to show that the savings secured by customers as a result of the operational projects implemented by the UK-Ireland FAB, exceed the ANSP implementation and operating costs, and that this shows a positive Net Present Value (NPV). Taking account of the estimated customer savings (Section 4.2) and the estimated ANSP costs (Section 5), the baseline scenario confirms that the FAB will deliver an overall positive financial result, with a Net Present Value of €176.1m by 2020. [Note: The period in question covers 2008 – 2020 (13 years). The discount rate for the CBA is 7.25%, which is an average for the nominal discount rate for the IAA and NATS.]
(d) the functional airspace block contributes to a reduction of the aviation environmental impact;	Significant environmental benefits have been / will be generated as a direct result of the projects implemented by the FAB to-date or in the near future. Customer benefit from access to more optimal routings, as result of; ▪ Free route airspace ▪ Longer direct routings ▪ Continuous Decent Approaches ▪ Greater airspace user flight planning flexibility ▪ Cross-FIR airway enhancements Therefore, during the period 2008-2020, environmental savings from existing projects (not accounting for any potential future unplanned implementation projects), are estimated at approximately 332,000 tonnes of fuel and 1.06 billion tonnes of CO2 emissions. More projects will be identified which will further increase these substantial environmental savings.
(e) values for costs and benefits, their sources and the assumptions made to develop the cost-benefit analysis were documented;	The following data sources were used; ▪ Published UK-IRELAND FAB Plans and Reports ▪ Exchange rates source: www.oanda.com ▪ Fuel costs per tonne source: www.platts.com ▪ CO2 Costs per tonne source: IATA Economics, 18/7/2011 ▪ Traffic Forecast source: EUROCONTROL Medium-

FAB IR Annex Part II, 4, requirements	Compliance Statement
	Term Forecast Flight Movements 2011-17, Oct 24th 2011 ▪ Non-fuel costs savings - Delay Costs Per Minute: Standard Inputs for EUROCONTROL Cost Benefit Analyses, Edition Number: 4.0, October 2009
(f) the main stakeholders were consulted and provided feedback on the costs and benefit estimates which are applicable to their operations.	The draft CBA was presented to the airline community at the second joint CEO/Customer Forum on the 7th December 2011, as part of the consultation and verification process. A copy was made available through both the IAA and NATS online security restricted customer websites from the 7th – 21st December. (Note: No changes were required to be made to the CBA as no feedback was provided by customers during the consultation phase.) As members of the FAB Management Board, the Irish and UK Military representatives were presented the CBA on the 6th December. Approval was secured on the CBA during this meeting. Staff within the IAA and NATS have direct representation within the Working Group structure and are continuously kept appraised of all FAB projects. The requirement to consult with staff on this retroactive CBA (i.e. its contents and its development) was therefore unnecessary.