



**COMMENT-RESPONSE DOCUMENT (CRD)  
TO ADVANCE NOTICE OF PROPOSED AMENDMENT (A-NPA) 2012-01**

**RELATED TO THE IMPACT ASSESSMENT FOR THE INTRODUCTION  
OF A HARMONISED EUROPEAN TRANSITION ALTITUDE (HETA)**

**'Harmonised Transition Altitude (Corrigendum)'**

## Explanatory Note

### I. General

1. The purpose of the Advance Notice of Proposed Amendment (A-NPA) 2012-01 was to collect stakeholders opinion on the Preliminary Regulatory Impact Assessment (PIA) related to the introduction of a Harmonised European Transition Altitude (HETA). In addition questionnaires were published aiming at the collection of additional information on potential consequences and costs related to HETA. This additional information is used for the update of HETA PIA on which the decision should be based for further rulemaking activities related to the harmonisation of transition altitudes throughout Europe.
3. This Comment-Response Document (CRD) as well as the attached updated version of the Preliminary Impact Assessment were developed in close cooperation with EUROCONTROL under the existing working arrangement between the Agency and EUROCONTROL.

### II. Consultation

4. The A-NPA was published on the website (<http://easa.europa.eu/rulemaking/notices-of-proposed-amendment-NPA.php>) on 29 February 2012.
5. The stakeholders were given the possibility to share their comments on the A-NPA by using the Agency's Comment-Response Tool (CRT) and by responding to online questionnaires with predefined questions adapted to different groups of stakeholders.
6. The closing date for the consultation (i.e. 29 May 2012) was not strictly applied (slightly extended)<sup>1</sup> due to request from some stakeholders.
7. Some of the stakeholders chose to comment through the CRT and to respond to the questionnaires as well.
8. 83 stakeholders responded to the online questionnaires and a summary follows with their responses.
9. Together with the A-NPA a questionnaire was distributed with the aim to collect additional information on the impact of potential regulatory action on the various stakeholders. The responses received are summarised below.
10. In order to achieve the optimum result the questionnaire was tailored to the specific needs of various stakeholders, which have been grouped as follows:
  - flight crews: 54 responses
  - aircraft operators: 10 responses
  - air navigation service providers: 10 responses
  - military authorities: 3 responses
  - national competent authorities (NSAs & CAAs): 6 responses
11. Out of 83 responses, 11 were in favour of option 1, 54 of option 2, and 18 of option 3. In general it can be said that the 'airborne side', i.e. flight crews and aircraft operators, saw a need for change with a clear preference for option 2 (4-48-12). The 'ground side' was more evenly divided amongst the three options (7-6-6).

---

<sup>1</sup> Due to a technical error the online questionnaires were not deactivated and the stakeholders continued to enter responses to one of them (HETAflightcrew) far after the official closing date. These responses were not taken into account.

12. One of the aims of the questionnaire was to gain an idea of the costs induced by the implementation of options 2 or 3. Only one (small sized) ANSP could quantify the costs across all areas and suggested a figure of EUR 7.1 million of investment. If this cost was extended pro rate across all ANSPs then there would clearly be a substantial cost impact on the ANSP community and these costs may of course affect route charges and airspace users. However, this cost data could not be considered as representative for all ANSPs and thus the need for data for a full cost impact analysis for the ANSP part is clearly on the critical path to any regulatory action. From the 'airborne side' the majority of the aircraft operators did not consider any additional cost and more than 80 % from the crew members did not see the need for any additional training.
13. Two out of three military authorities considered that the implementation of option 2 or 3 will bring additional cost for them.
14. With respect to safety, the 'airborne side' as well as the CAAs/NSAs that responded appeared convinced that option 2 or 3 would improve safety whereas the ANSPs were less certain (they were about 50:50).
15. With options 2 and 3 the 'airborne' side saw clear improvements in the operational environment and a step towards harmonisation in Europe. The ANSPs did not expect an increase in capacity by the implementation of option 2 or 3.
16. Overall: the results suggested that the 'airborne side' saw benefits from an implementation of option 2 or 3 whereas the 'ground side' did not appear to see such an improvement and also saw the risk of additional costs.

### III. Publication of the CRD

17. All comments received in the CRT have been acknowledged and incorporated into this Comment-Response Document (CRD) with the responses of the Agency.
18. It has to be noted that the CRD contains only the responses to the comments provided through the CRT tool, not to the responded questionnaires. The responses to the online questionnaires have been taken into account when updating the HETA PIA.
19. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:
  - **Accepted** — The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
  - **Partially accepted** — Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
  - **Noted** — The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
  - **Not accepted** — The comment or proposed amendment is not shared by the Agency.

20. The resulting text in the updated Preliminary Impact Assessment (PIA) highlights the changes as compared to the initial Preliminary Impact Assessment. The updated PIA version 2.0 is attached to this CRD (Attachment A).

#### **IV. The way forward**

21. The Agency will report the results from the A-NPA consultation and the updated Preliminary Impact Assessment to the Single Sky Committee (SSC) meeting on 15 and 16 October 2012 with the proposal to initiate the HETA rulemaking task. During the drafting activities the Agency should be supported by a rulemaking group and by EUROCONTROL in accordance with its working arrangement with EASA. One of the main emphasis for this rulemaking task should be the development of the CBA in order to select the most suitable rulemaking option.
22. As soon as the rulemaking group completes the drafting, the Agency shall publish an NPA justifying duly the most appropriate rulemaking option.

## V. CRD table of comments, responses and resulting text

<b>(General Comments)</b>	-
---------------------------	---

comment	22	comment by: <i>Cessna Aircraft Company</i>
	Cessna Aircraft Company has no comment on this issue at this time.	
response	<i>Noted</i>	

comment	23	comment by: <i>Luftfahrt-Bundesamt</i>
	<p><b>Kommentar LBA</b></p> <p>Die derzeitige einheitliche Regelung der Transition Altitude über der Bundesrepublik Deutschland auf einen bestimmten Wert, hier: 5000 ft, hat sich bewährt, da Eindeutigkeit vorliegt und ein Checkpunkt für die Besatzung wegfällt. Nachteilig wirkt sich jedoch die mit 5000 ft eher zu tief gewählte TA aus, da diese bei Luftfahrzeugen mit großer Steigrate mitten in die Departure fällt und des öfteren stört, wenn ATC erhöhte Aufmerksamkeit erfordert. Eine einheitliche Anhebung der TA europaweit ist von Vorteil. Im europäischen Ausland haben die jeweiligen Flughäfen unterschiedliche TAs. Das bedeutet, dass die TAs grundsätzlich zu checken sind und im Take Off Briefing explizit noch einmal gebrieft werden müssen. Dies kann somit entfallen. Eine einheitliche Regelung auf den FL 100 wäre in Bezug auf die Arbeit im Cockpit ideal, da der FL 100 – Call ohnehin ein „Check-Event“ darstellt ( Lights OFF, FMS Autotune for cruise, After Take OFF Checklist etc.). Die After Take OFF Checkliste beinhaltet auch den Punkt Altimeters – hier könnte nun die Transition abgearbeitet und gecheckt werden. Der Nachteil für den FL 100 ist, dass die jeweilige MSA für die Hochgebirgsflughäfen nicht abgedeckt werden können. So müsste eine Anhebung für das Gebiet Mont Blanc sicher auf FL 140 erfolgen. Eine Anhebung der TA europaweit ist in jedem Fall zu befürworten, da Verwechslungen ausgeschlossen werden. Man sollte sich jedoch auf den kleinstmöglichen Wert beschränken. Pauschal den Wert FL 180 zu wählen, weil die Amerikaner dies so handhaben, ist zu einfach gedacht, da der IFR-Verkehr im Low Level Flight besser LEVEL als AILTITUDE fliegen sollte, damit ATC nicht fortwährend die örtlichen QNH-Werte übermitteln muss.</p> <p><b>Das LBA würde Option 3 (TA 10,000 ft) zustimmen, die gleichzeitig die Empfehlung des Appendix 1 ist.</b></p>	
response	<p><i>Noted</i></p> <p>Your preference for option 3 will be marked in chapter 7.2 of the PIA. Your remarks about the usefulness of 10 000 ft as TA will help to clarify the reasoning in the PIA and will be reflected in chapter 5.3.4 and Annex A.4.</p>	

comment	34	comment by: <i>Deutscher Aero Club e.V. (DAeC)</i>
---------	----	--

The new attempt to harmonise the Transition Altitude for all European Air Space is very much welcomed by Europe Air Sports (EAS). Looking at the geographical variety in Europe we think that only the proposed HETA of 18.000 feet will give the full advantage. Option three is in our opinion just another weak compromise which should not be followed.

EAS represents x-thousand with

The deliberate choice of transition altitudes makes cross boarder activities, FIR as well as country borders, unnecessary burdensome to plan. This becomes very obvious looking at multi-border areas like the one between France, Germany and Switzerland or Austria, Czech Republic and Germany.

Most air sports activities happen between GND and 10.000ft AGL. Contrary to CAT which usually will be affected twice per flight on Departure and Approach. GA and Air Sports activities like cross country VFR flying and even more distinct Glider and Paragliding activities might cross this artificial border many times per flight requiring adjusting of altimeters in order to honour air spaces which might either be related to QNH or Standard Altimeter Setting.

response *Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.

comment 40

comment by: UK CAA

In considering the Advanced Notification of Proposed Amendment (A-NPA) 2012-01 Harmonised Transition Altitude it was noted that the potential policy options were limited to only one Implementing Rule that specified an exact level for harmonisation - 18,000ft. However, the Preliminary Impact Assessment (PIA) on a Harmonised European Transition Altitude at Appendix 1 to A-NPA 2012-01 recommended that: 'Regulatory action to prescribe common criteria for the determination of TAs at or above 10,000ft should be the preferred option for harmonisation of TAs in European airspace'; which allows ANSPs and NSAs some discretion in implementation, whilst not precluding 18,000ft.

It is acknowledged that in exploiting the benefits of a Harmonised European TA 'at or above 10,000ft' there are challenging safety and operational impacts to be overcome and mitigated, not least of which are those associated with national and Functional Airspace Block interfaces, particularly where there may be continued differences in TA.

The UK CAA is currently undertaking a national aviation stakeholder consultation on the Policy to Introduce a Harmonised Transition Altitude of 18,000ft in the London and Scottish Flight Information Regions; the first round of consultation is complete and the second is due to commence later in the year. At this time we are unable to confirm the outcome of this work.

The UK CAA supports the PIA recommendations that:

'Regulatory action to prescribe common criteria for the determination of TAs at or above 10,000 ft should be the preferred option for harmonisation of TAs in European airspace.

Wider views of Stakeholders, including the impact on military operations, and additional quantitative data should be sought as a next step in order to confirm the findings of this PIA.'

The UK CAA supports the principle of a common harmonised European Transition Altitude, providing the benefits associated with this can be realised in regard to the safe, efficient and sustainable use of airspace.

response *Noted*

Your support regarding PIA recommendation for option 3 will be marked in chapter 7.2 of the PIA.

Your current national aviation stakeholder consultation on the Policy to Introduce a Harmonised Transition Altitude of 18 000 ft in the London and Scottish Flight Information Regions will be reflected in Annex B to the PIA.

Your support regarding PIA recommendation for option 3 will be marked in chapter 7.2 of the PIA.

Your current national aviation stakeholder consultation on the Policy to Introduce a Harmonised Transition Altitude of 18 000 ft in the London and Scottish Flight Information Regions will be reflected in Annex B to the PIA.

'On 11 July 2012, the UK CAA, Directorate of Airspace Policy, published the results of the first stakeholder consultation on the introduction of a Harmonised TA of 18 000 ft in the London and Scottish FIRs. A total of 52 responses were received, resulting in the following views:

Support: 20 responses

Broadly supportive: 10 responses

Unable to support: 7 responses

Oppose: 11 responses

Neutral: 4 responses

The UK CAA will initiate a second round of consultation at the end of 2012 aiming at a more detailed impact assessment including operational, equipment, manpower and overall cost evaluation.'

comment 58 comment by: *Swiss International Airlines / Bruno Pfister*

SWISS Intl Air Lines supports Option 2, i.e. 18.000 FT as the Harmonized European Transition Altitude.

response *Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.

comment 77 comment by: *Alitalia*

Alitalia strongly supports Option 2 of the proposed regulatory options: "Implementing Rule to implement a HETA at 18000 ft", as it is considered the best option for improving both flight safety and ATM efficiency.

response *Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.

comment	93	comment by: HCAA/D4/B
	Please find attached the A-NPA 2012-1 ON HETA	
response	<i>Noted</i>	
comment	94	comment by: HCAA/D4/B
	Attachment <a href="#">#1</a>	
	Please find attached the A-NPA 2012-01 ON HETA	
response	<i>Noted</i>	
	Your preference for option 3 will be marked in chapter 7.2 of the PIA. Your comments regarding the safety risks due to increased ATCO-pilot communication has been added in Annex A.1 to the PIA.	
comment	96	comment by: ITA Air Force - Airspace Branch
	Attachment <a href="#">#2</a>	
	Please find attached ITA General Air Staff comments on HETA implementation.	
response	<i>Noted</i>	
	Your preference for option 1 will be marked in chapter 7.2 of the PIA. Your statements regarding potential costs have been used to update the scoring tables in Annex B to the PIA.	
comment	97	comment by: Tim Mackay
	<b>GATCO response to the Consultation on A-NPA 2012-01 of 28 February 2012 on Harmonised Transition Altitude</b>	
	GATCO UK has reached its position on the proposal taking into account the stated aims and objectives in the EASA consultation on a proposed rulemaking on transition altitudes in Europe.	
	GATCO agrees with the text of the EASA consultation paper which states 18000ft to be the preferred option from a technical point of view.	
	GATCO believes that The Agency should recommend Regulatory Option 2 to implement a HETA at 18000ft.	
	GATCO believes that any requirement to implement Transition Altitude(s) at or above 10000 ft (high level transition altitudes) will impact on ANSP staff, particularly controllers. Many changes to equipment and procedures will be	



required and some of these will necessitate significant staff training programmes.

GATCO believes that unco-ordinated implementation of high level transition altitudes is not desirable particularly because of the adverse effect it would have on capacity in those areas of busiest cross border traffic. This would arise from the requirement to create buffer zones between areas using different altimeter setting procedures. In areas where the buffer zones would be close to busy terminal airspace it would impose an increased controller workload in sectors already subject to high workload meeting standing agreements and other co-ordination procedures particularly those serving climbing and descending traffic. In these circumstances it is difficult to see how current practices and procedures could be modified to mitigate against inevitable reductions in capacity. The increase in workload and complexity could also generate a number of safety risks.

GATCO accepts that it may take a long time to secure a co-ordinated introduction of the 18000ft transition altitude because of the implementation challenges to aviation, in particular the changes required within Air Traffic Services. The raising of the TA to 18000ft will be a fundamental change for aviation in Europe and the implications are widespread across the industry, affecting commercial and military operations, recreational flying and other airspace activities. However GATCO believes such a change would provide long term benefits and the Regulatory Process provides the best means to achieve it.

T Mackay  
 Vice President Policy  
 GATCO UK  
 29-5-2012

response

*Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA. Your qualitative assessment on the increased cost for ATCO training and additional equipment for options 2 and 3 is reflected in Annex A.2 to the PIA. Your comments related to the need for a coordinated implementation of a HETA will be considered in case further regulatory action is taken.

comment

103

comment by: *Boeing*

Boeing supports Option 2: Implementing Rule Mandating a HETA at 18,000 ft Boeing considers that full harmonization of transition altitude (TA) throughout the airspace is the best option. Even though EASA identifies Option 3, then 1, as most cost efficient options, we maintain that harmonizing at 18.000 ft will provide not only internal European harmonization, but also harmonization with other areas of the world, particularly the entire US and North American continent.

JUSTIFICATION: Option 2 is the optimal choice for harmonization of TA and crew procedures in Europe and world-wide.

response

*Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.



comment 65

comment by: *NATS National Air Traffic Services Limited*

Harmonising and raising the Transition Altitude (TA) is a positive step towards safety improvement through the standardisation and simplification that it will bring, as well as being a critical enabler for the design of future airspace, particularly in the congested and complex south-east of England. As such, NATS is fully committed to developing the solution for a higher harmonised TA for the UK/Irish FAB.

The above benefits derive from raising the TA significantly and harmonising at a single level. The choice of level, and its impact on the existing airspace structures and systems, affects the complexity involved in implementing the change. The decision on an appropriate level therefore needs to be a balance between design need, enabled safety benefits and implementation impact.

The work carried out by NATS over the past 8 months considers both the optimum TA level and the ability to transition airspace towards this optimum.

With regards to the options presented in this A-NPA, the NATS views are as follows:

**Option 1:** As stated in the A-NPA, this makes no progress towards the aims of SES. Whilst we accept that this could make some small progress to reduce fragmentation, it does not make a significant step towards the harmonisation that is required.

**Option 2:** The work carried out to date suggests that a TA of 18000ft may be preferred for the design of airspace to enable more optimised arrival and departure profiles. However, based on the detailed assessment carried out, it cannot be demonstrated that moving to a level of 18000ft delivers an optimum balanced benefit, due to the scale of impact on our operation from the complexity of transition.

The constraints of current airspace, combined with the lack of a harmonised approach at UK boundaries, **may** unnecessarily increase workload and complexity and generate a number of high severity safety risks with a TA of 18000ft.

**Option 3:** Our work to date is demonstrating that there is potential for a TA higher than today's and lower than 18000ft, to provide a better overall solution, allowing for many of the benefits of harmonisation and future airspace design while reducing the impact of transitional activities needed to manage the current airspace and UK external boundaries.

Further investigation is being undertaken, in conjunction with the UK CAA, to further develop the optimal solution, taking full cognisance of this EASA consultation.

On this basis, option 3 is NATS' preference at this stage.

response *Noted*

Your preference for option 3 will be marked in chapter 7.2 of the PIA.  
See also response to comment 40 from UK CAA.

**EXECUTIVE SUMMARY**

p. 2-3

comment	5	comment by: <i>Christoph Gilgen</i>
	Yes, to change the altimeter setting in the middle of a SID or STAR, and surrounded by high terrain is for sure not the safest solution.	
response	<i>Noted</i>	
comment	6	comment by: <i>Christoph Gilgen</i>
	In Europe the borders are sometimes very close together, and so the TA or TL of an airport reach immediately before / or after take-off or landing to an airspace that is under the legislation of another (neighbouring) State. This is why the idea of a European-wide and harmonized solution makes a lot of sense. Also safety-wise.	
response	<i>Noted</i>	
	Your comment (taking into account also your comments No 10 and 11) is interpreted as preference for option 2 and will be marked as such in chapter 7.2 of the PIA.	
comment	64	comment by: <i>London Luton Airport Operations Ltd</i>
	<p><b>executive Summary para 2 - The Problem</b></p> <p>Agree with the statements. The current TA policy is out of date and not suited to modern aviation. There are currently too many TA's across Europe which is detrimental to safety due to the flight phase being the most critical. This issue is exacerbated at aerodrome s like Luton which sit within busy airspace. the forecasts for growth will further increase the likelihood of risk being realised, as identified in the various elements of this document and others concerning safety factors.</p> <p>Eurocontrol recommends a "common" TA, as do IFALPA and ICAO. The requirements are for a common or harmonised TA and the option for 10,000 feet or above opens up the options to be disparate. This has potential to place Europe back in a similar position it is in today, the TA will be different amongst states and not high enough.</p> <p>Locally, the issue of level busts was studied by the UK CAA and the well known (in the U.K.) Level Bust Working Group analysed 626 reported level busts and found that 68 (10.9%) these were caused by altimeter mis-setting. As London Luton Airport Operations Ltd operates within the busy London TMA, it would</p>	

advocate that the variety of reports which recommend the harmonisation of the TA, be instilled. At 10,000 feet the issues relative to TA of 6,000 feet remain and this is not high enough. 18,000feet has been determined by airspace users as the preferred option and will have additional benefits such as providing the foundations for airspace developments.

response *Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.  
Your reference to the outcome of Level Bust Working Group will update point 2.1 of the PIA.

comment 92

comment by: *IFATCA*

IFATCA represents over 50'000 Air traffic controllers in over 140 countries and we welcome the possibility to contribute to the A- NPA 2012 -01 on transition altitude (TA) with regard to further rulemaking activities for the harmonisation of European TA.

IFATCA has a global policy on TA which is recommended to its' global membership as professional standard:

"Standardisation of Transition Altitudes on a region wide basis be implemented where applicable"

based on the rationale that

"Problems can arise if Transition Altitudes vary between adjacent FIR's.

Therefore IFATCA recommends to favours Option 3 for any possible future rulemaking.

We have read and understood the various explanation in the A-NPA 2012-01 and we have noticed that there is no questionnaire for Air Traffic Controllers.

Following points should be addressed if Option 3 is retained as the favourite option.

It needs to be a common TA ideally for the whole ECAC region and the implementation date has to be chosen in such a way that the whole region can move at the same date. This would be suitable for an Implementation Regulation. Based on the experience with RVSM time is needed to inform, educate and train all the stakeholders which will be affected by this. Therefore IFATCA recommends that this implementation date is chosen in a realistic time frame. Taking into account the time needed for establishing AMC and GM on the topic mentioned above and identified in the Impact assessment on the various options.

Particular attention needs to be given to the interface with adjacent regions/FIR which might not be associated to this move. This is of particular importance if the implementation should be limited to the 27 +2 states under the SES regulatory frame.

Elements which will have to be addressed are:

- interfaces (geographic and possibly vertical extension - e.g. if going for a transition phase as proposed in Option 2)
- synchronisation of a common implementation date (similar to RVSM)
- workload issue as the Radio telephony load on the en-route sectors will have to be assessed from a safety perspective
- best practise - in the US our members have been working since decades with a common continental wide TA without any major impact on Safety.
- impact on Capacity. Certain areas in the ECAC area might be losing capacity due to the common TA, this should be assessed with the experience of the US/FAA and possible mitigation should be proposed via GM.

For any further questions or information, do not hesitate to contact Mr. Zeljko Oreski, Executive Vice-President Europe IFATCA. [evpeur@ifatca.org](mailto:evpeur@ifatca.org)

response *Noted*

Your preference for option 3 will be marked in chapter 7.2 of the PIA.  
Your comment relevant to the implementation date and elements to be addressed will be considered if further rulemaking activities will be undertaken.

## A. Explanatory Note - I. Introduction

p. 5

comment

7

comment by: *Christoph Gilgen*

Yes, with modern jet aircraft, climbing fast and with high-performance out of an airport, the low TA-option is for sure not the preferred one.

response

*Noted*

See the response to comment No 6.

comment

8

comment by: *Christoph Gilgen*

I fully agree, that due to the lack of progress in this matter (since 2000), a binding EU-legislation is required here. This is the only "good way" to speed up and get some positive and good results now.

response

*Noted*

See the response to comment No 6.

comment

27

comment by: *BELGOCONTROL*

**Bullet 2 states:**

"However, this provision appears to be rather out dated as it was originally established in the late 1950s and does not reflect the performance of modern aircraft, flight procedures and terminal areas (i.e. the areas where transition altitude often resides) that are becoming extremely congested."

BELGOCONTROL is of the opinion that it is not because this provision dates from the late 1950s that it is outdated. What concerns BELGOCONTROL it still works perfectly.

**Bullet 3 states:**

In establishing Functional Airspace Blocks (FABs) various Member States have encountered difficulties related to the fact that transition altitudes are not harmonised in Europe.

BELGOCONTROL recognizes the lack of harmonization of the TAs in Europe, but why should this harmonization be at 10000 ft or above. Harmonization in the application of all the procedures associated with transition altitude would already give considerable benefit. If only the following ICAO PANS-OPS requirement i.e. a minimum of 3000 ft height above terrain and the calculated height of the TA to be rounded up to the next full 1000 ft would be correctly applied by all European States, then this would already lead to a reduction of the number of TAs from over 50 to a maximum of 9.

response *Noted*

Your comment (together with comments No 30 and 42) is considered as a preference for option 1, and will be marked as such in chapter 7.2 of the PIA and in the recommendations.

Additional comment to bullet 2: it is not the fact that the provision dates in the late '50s are the actual compelling factors. What is important is the fact that at that time the performance of aircraft was completely different. The TAs as currently defined are reached by modern aircraft very soon after departure, at a phase of flight when the crew is still very busy.

Additional comment bullet 3: harmonisation is only one problem that this activity tries to address. The second aspect lies in the fact that the current TAs in many cases are too low considering the flight profiles of modern aircraft. Raising the TA above 10 000 ft could address at least this aspect. Furthermore, the fact that also with option 3 a change has to occur in the TA and that the proposed AMC/GM will set rules for the harmonised determination of a TA, there is an opportunity for not only raising but also harmonising the TA since a TA above 10 000 ft would be feasible almost throughout the entire airspace of Europe. This initiative could serve as a trigger towards harmonisation.

comment 35

comment by: *Deutscher Aero Club e.V. (DAeC)*

4. Totally agree. A HETA should be aimed for. Any compromise giving freedom of choice to national airspace regulator will only raise the problem to new levels.

response *Noted*

Your support for further rulemaking activities (taking into account also your comment No 33) is interpreted as preference for option 2 and will be marked as such in chapter 7.2 of the PIA.

comment	76	comment by: <i>STASA - Italy</i>
	<p>With reference to paragraph 2 and 3, we believe that the views stated in the document do not sufficiently demonstrate that a EU-Legislation is necessary for creating a Harmonized European Transition Altitude (HETA).  On the one hand and for example, while not having a deep knowledge of how it played a similar process in North America, it seems reasonable to assume that there has been no legislative action of supra-national institutions, but only agreements between the aeronautic authorities of Canada and USA.  On the other hand, if the difficulties encountered so far in Europe were due only to differences between the views of the Member States, probably the same differences would arise in the process of development of a shared EU-Legislation.  However, in spite of the above reasons, if this will help to overcome current difficulties we are not a priori against the introduction of an appropriate EU-Legislation.</p>	
response	<i>Noted</i>	
	Your comment is interpreted as preference for option 1 and will be marked as such in chapter 7.2 of the PIA.	

**A. Explanatory Note - III. Summary Regulatory Impact Assessment - A. Regulatory options**

p. 6-7

comment	4	comment by: <i>Christoph Gilgen</i>
	<p>The problem is that FABs do not really progress well - so to base the No Regulatory intervention approach - together with FABs progressing badly, comes very close to a "do nothing approach"</p>	
response	<i>Noted</i>	
comment	9	comment by: <i>Christoph Gilgen</i>
	<p>Due to perceived lack of progress of most of the FABs, this "Do Nothing" approach, coupled with the difficulties of the FABs to progress well - means kind of WAIT AND SEE for the Harmonization of TA. This is not at all acceptable.</p>	
response	<i>Noted</i>	
comment	10	comment by: <i>Christoph Gilgen</i>
	<p>This is definitely my preferred option - it works very well in the US as well as Canada. I believe as well that Mexico has the same solution of 18000 Feet?</p>	



response

*Noted*

See response to comment No 6.

comment

11

comment by: *Christoph Gilgen*

The option is the less preferred option for me, but better than the DO NOTHING approach, coupled together with the FABs.

The advantage of the 18000 Feet TA is that in "my airspace", Geneva ACC, all the SIDs and STARs would be working within the QNH-settings. This would avoid critical Altimeter and QNH-setting changes in the middle of SIDs and STARs. Additionally to this flying a SID or STAR with QNH-set to the applicable local value - Flight OPS most of the times very close to terrain and mountains, has the advantage that we eliminate one danger we currently have (true altitude error due to FL compared to QNH - in particular if the QNH is very "high").

response

*Noted*

See response to comment No 6.

Your comment related to the SIDs and STARs is reflected in Annex A.5 to the PIA.

comment

20

comment by: *skyguide Corporate Regulation Management*

1. **Regulatory activity towards harmonization** in this regard **is desirable** and is expected to bring higher safety levels.
2. **Evolution rather than revolution.** A "Big-Bang" approach, as envisaged by the option 2 - imposition of 18.000 ft - may actually compromise the safety through an unprecedented volume of the destabilization of the system that is inevitable if this option is chosen.
3. **Option 3 is a preferred option.** Any value of 10.000ft or more harmonized with our FABEC partners and neighbors - proved to be safe is acceptable.
4. **skyguide does not oppose 18.000 ft** , if this value comes **as a result of the application of the option 3** and is proved to be safe

response

*Noted*

Your preference for option 3 will be marked in chapter 7.2 of the PIA.

comment

24

comment by: *IATA*

IATA strongly support Option 2 of this document. An harmonized transition altitude at 18000 ft will improve safety by harmonizing and standardizing operations across different regions of the world, while at the same time providing for more efficiency in the utilization of TMAs.

response *Noted*

Your preference for option 2 will be marked in chapter 7.2 of the PIA.  
Your qualitative assessment for the improvement of safety and flight efficiency is reflected in Annex A.1 and A.5 to the PIA.

comment 28

comment by: *BELGOCONTROL*

With regard to bullet 12;

BELGOCONTROL deplores the fact that a 4th option for TA at 5.000 ft or 6.000 ft has not been envisaged nor assessed in the PIA. To study also this option was a recommendation at ANT/32 i.e:  
*"to study an altitude below 10.000' on the basis of a sub-regional (FAB) application."*

response *Noted*

Your recommendation for another option may be considered if further rulemaking activities will be undertaken.  
Furthermore, see response to comment No 50.

comment 33

comment by: *Deutscher Aero Club e.V. (DAeC)*

Point 17 Option 3. In the present FIR and state border situation it seems strange to just raise the problem by a couple of thousand feet to something at or above 10.000 feet. What if neighbouring countries do not agree to work on the same level? If they do we have one altitude as no FIR is without a neighbour.

response *Noted*

See response to comment No 35.  
The aim of raising the TA at or above 10 000 ft is to remove it from the phases of flight with the highest cockpit workload. Furthermore, since with a TA at or above 10 000 ft changes would have to be implemented in the great majority of ANSPs, and since the AMC and GM would prescribe proper coordination procedures across airspace boundaries, there is a chance that this cooperation would result in a more harmonised environment even without prescribing a specific TA.

**A. Explanatory Note - III. Summary Regulatory Impact Assessment - B. Most important impacts identified for each option?**

p. 7-8

comment 1

comment by: *FFVV - French Gliding Association*

The highest transition altitude is a better and safer solution for sailplane pilots,

	who generally work with ATC with an sea level altimeter setting, especially in mountaneous areas such as French Alps. A transition layer around 10 000 ft would be less interesting.
response	<i>Noted</i> Your preference for option 2 will be marked in chapter 7.2 of the PIA.

comment	18 <span style="float: right;">comment by: FAA</span>
	AFS-200, FAA, Part 121/135 Air Carrier Operations Branch, strongly endorses Harmonizing Transition Altitudes and Transition Levels throughout Europe.  <b>Reason:</b> The wide variance and frequently low level of altimeter transitions leads to confusion, increased workload and cockpit disruption during a vulnerable period of every flight.  <b>Recommendation:</b> AFS-200 supports option 2: Transition of 18,000' / FL180. An altitude consistent with North America is not as important as an altitude/level that provides terrain clearance and ease of use. Compensation for pressure systems is available within procedures  <b>Safety Impact:</b> A consistent altimeter transition will enhance coordination both within and outside the cockpit. Transitions well above terrain will mitigate altimeter settings as problem with CFIT. Transitions outside the approach area will enable greater focus by the crew on aircraft operation during critical phase of flight.
response	<i>Noted</i> Your preference for option 2 will be marked in chapter 7.2 of the PIA. The safety impact contained in your comment is reflected in Annex A1 and A.4 to the PIA.

comment	19 <span style="float: right;">comment by: FAA</span>
	AFS-200 further supports all commentary within the document that are in favor of Harmonizing Transition Altitudes and Transition Levels with no adverse comment for any supporting argument. AFS-220 finds Harmonization represents a significant enhancement in safety.  <b>Reason:</b> Varied local transitions challenge crew and controller operations during flight regimes where consistency and predictability are most important. This problem is enhanced when altimeter transitions occur below FL100 as they do in many places within Europe.  <b>Recommendations:</b> AFS-200 also supports option 3 as a secondary choice: any altitude/level above 10,000'/FL100. The establishment of this transition should be as high as

practical for an area. Consistency within states and facilities is critical.

**Safety Impact:**

A common transition will negate the potential erroneous settings caused by early, anticipatory altimeter changeovers

response *Noted*

The safety impact contained in your comment is reflected in Annex A.1 and A.4 to the PIA.

comment 25

comment by: *IATA*

The difference in QNH adjustments between a common transition altitude above 10000 ft and a 18000 ft transition altitude, is negligible.

Variations of QNH values in a short period of time are uncommon and the associated risks are anyway mitigated by training and standard operating procedures.

response *Noted*

The safety impact contained in your comment is reflected in Annex A.1 (steep pressure gradients) to the PIA.

comment 26

comment by: *BMVBS*

Considering the cost-benefit proportion (significant changes in training, airspace structure and procedure design vs. relocation of pilots workload), Germany sees no need to increase its common transition altitude of 5000ft.

In detail to the negative impacts of option 2 & 3:

- If a higher altitude will be established the introduction of an area QNH will be necessary since air pressure is changing with topography and it has to be assured that aircraft flying in certain areas are using the same pressure setting in their altimeters to maintain the required vertical separation minima. This area QNH will not be practical for landing an aircraft at an aerodrome. During the landing process pilots will have to set the local QNH of the aerodrome of destination to have a vertical reference to the aerodrome (altimeter shows field elevation upon landing) (in the US pilots will set altimeter to QFE, altimeter will show 0 on ground). So there is **no benefit** in respect to the **workload of pilots**, they still will have to change the pressure value during the landing phase (in the vicinity to the aerodrome they intend to land on).
- All VFR traffic will be affected, since aircraft on a VFR flight up to 5000ft MSL (or 2000ft above ground) are requested to set the air pressure of the aerodrome with ATC nearest to the nearest route of flight ( AIP Germany ENR 1.7-1). So if the transition altitude (5000ft) will be raised, all aircraft on a VFR flight at any altitude

(below TA) in any airspace category (C,D,E,F) must be provided with lots of QNH values for example on a flight from Munich to Hamburg thus **increasing workload** for pilots and controllers. If the rules would change, still an area QNH would be required including the same disadvantages as mentioned before.

- The area QNH values must be coordinated between the adjacent areas, which **increases the workload of the controllers**. The different values may **negatively influence safety** of aircraft which are operating on different QNH values at bordering sectors. It may have a **negative influence on the capacity**, if vertical separation minima will have to be increased to overcome pressure differences.

All those problems will not occur if aircraft are flying on standard pressure setting (1013) down to the lowest possible value.

Since pressure is a physical phenomenon, it is not possible to introduce a solution which is applicable all over Europe with the different topographical attributes.

To summarize:

A higher transition altitude will lead to an **increase of workload** for all parties concerned and will have **negative impact on safety and capacity**.

Therefore **Germany supports option 1** (no regulatory intervention). Option 2 and 3 cannot be supported.

response

*Noted*

Your preference for option 1 will be marked in chapter 7.2 of the PIA.

The impact on workload and capacity contained in your comment is reflected in Annex A.1, A.2 and A.4 to the PIA.

Additional considerations:

Bullet 2: To address this statement properly, it would be necessary to consider just how many flights are likely to be affected.

Bullet 3: According to ICAO Doc 4444, 4.10.4.2 ACCs already today 'shall have available for transmission to aircraft, on request, an appropriate number of QNH reports or forecast pressures for the FIRs and control areas for which they are responsible, and for those adjacent'. Therefore, a change in the TA should not impose any additional coordination procedures.

comment

30

comment by: *BELGOCONTROL*

21. Impact of Option 1 - Do nothing:

Do nothing is according to BELGOCONTROL not an option, non-standardised altimeter setting procedures should not be tolerated, but resolving this problem does not need a harmonization at 10.000 ft or above. A Harmonisation at 5000ft will satisfy, impact on aTM system, ATCO training, ATM procedure would be reduced to a minimum thus resulting in minimum cost for implementation.

22. Impact of Option 2 - Implementing Rule to Implement a HETA at 18 000 ft:

There will be definitely increased workload as well for pilots as for ATCOs. Raising the TA 18.000 ft will automatically induce an additional system of altimeter setting namely a area/regional QNH system. This in itself will double the number of altimeter settings. (from local QNH to area/regional QNH to standard QNH and vice versa)

Also the workload in the cockpit will increase as additional QNH settings are required thus resulting in an increased risk due to human error.

capacity and efficiency improving TMA procedures **would be potentially better**, is there a proof of this statement or is it just a feeling?

23. Impact of Option 3 - Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft:

"there would be similar advantages and disadvantages as Option 2, but Option 3 would allow ANSPs more flexibility taking into account local constraints, but there could potentially be a less simplified and predictable ATM environment than under Option 2, because a single TA is not prescribed"

Allowing more flexibility for ANSPs would not satisfy the objective of harmonization, that's why BELGOCONTROL thinks that this is no option. BELGOCONTROL recognises the need for harmonization but cannot agree with the limited proposed options. We would recommend an harmonization at 5000 ft or 6000 ft.

The workload in the cockpit will increase as additional QNH settings are required thus resulting in an increased risk due to human error.

capacity and efficiency improving TMA procedures **would be supported**, is there a proof of this statement or is it just a feeling?

the impact as described in this paragraph is for a TA of 10000 ft and not for a TA above 10000 ft. Moreover the comparison is only made with option 3 and not with option 1 which is the current situation.

As a general remark to this chapter; BELGOCONTROL has the impression that this impact assesment is based on assumptions and not on real facts.

"potential for an improved use of Continuous Descent Operations (CDOs), as well as high performance departure procedures/CCOs, **may not be fully realised**; **would be advantages** for flight crews; capacity and efficiency improving TMA procedures **would be potentially better**; thus **could realise** potential environmental benefits, ect.

BELGOCONTROL proposes to conduct a CBA to have evidences of these statements.

response

*Noted*

Your proposal to proceed with CBA will be reflected in PIA 5.2.5 and 5.3.5 and in the recommendations.

Additional considerations: a harmonisation at 5 000 or 6 000 ft would not necessarily address the issue of removing the altitude reference setting procedure during the busiest phase of flight.

Point 21: If 'do nothing' is not an option and action is required it is hard to understand why this action should not take airspace users requirement of a higher TA into account.

Point 22: In the report on the 'Feasibility Study for Transition Altitude Change in Northern Europe' (5.2.3) it is stated that 'From the simulations relating to the introduction of the point merge system in Oslo TMA it has been concluded that the introduction of this system would improve the capacity by approximately 30 per cent'.

Point 23: It is not clear why 6 000 ft would be so much different for the ANSP than a higher value.

comment	<p>36 <span style="float: right;">comment by: <i>Deutscher Aero Club e.V. (DAeC)</i></span></p> <p>22. For most light GA and Air Sports pilots a HETA would mean that they can fly on QNH setting only, thereby reducing the risk of a wrong setting to almost zero. Due to the very different flight profiles of light GA and air sports the safety gain would be remarkable.</p>
response	<p><i>Noted</i></p> <p>The PIA on safety impact will be updated accordingly in chapters 5.2.1 and 5.3.1 as well as in Annex A.1.</p>

comment	<p>66 <span style="float: right;">comment by: <i>London Luton Airport Operations Ltd</i></span></p> <p>Under point 22 The harmonisation of the TA is an enabler of other airspace planning initiatives concerning functional airspace blocks. disparity between the states and aerodromes within sates will leave the same challenges in place as there are today, albeit the TA will be higher.</p> <p>A single TA has the potential to simplify the future technological developments where automation of pressure settings can take place, within the framework of defining how that process would operate. (it is not intended to elaborate on this process and it is accepted this is not tangible evidence today)</p> <p>Under point 23. this does not take into consideration all the safety factors identified in accident and incident report and recommendations from the same. It will simply raise the TA to 10,000 feet or higher but not offer the consistency of a determined altitude. bullet point 7 does not go far enough and identify the most critical aerodromes or airspace areas. Typically the most critical is the busy airspace surrounding aerodromes such as Heathrow, Schipol, Brussels, Munich, Paris etc. Where safety, capacity, performance and environmental improvements can be made, consideration must be given to maximising these opportunities in the planning for TA harmonisation. by the time the change is adopted at 10,000ft the benefits may have been reduced again through restraints imposed by increased traffic demand. this must account for the position in 20 - 30 years. it is evident that pilots remain busy at 10,000 feet descending or climbing as they either enter the phase of preparation for descent or are adapting to the end of the critical phase of climb.</p>
response	<p><i>Noted</i></p> <p>Together with comment 64 this is interpreted as your support for option 2 and will be reflected accordingly in chapter 7.2 of the PIA.</p>

**A. Explanatory Note - IV. Questionnaire**

p. 8-9

comment

95

comment by: *IFATCA*

IFATCA notes that for ATCO there is no questionnaire. We have therefore used the ANSP questionnaire to answer the questions.

response

*Noted***B. Appendix 1 - Preliminary Impact Assessment Harmonised European Transition Altitude.**

p. 11

comment

37

comment by: *Deutscher Aero Club e.V. (DAeC)*

Summary: 1) The flexibility of a TA at a variable altitude is of course the biggest disadvantage as well. The reasoning for a HETA are derived from the Problem that there are too many TA. What is achieved by just raising them to a different level?

Recommendation: disagree, only option 2 (HETA) gives the maximum harmonisation.

response

*Noted*

Additional considerations: It was not only the multitude of TAs that initiated the discussion but also the fact that most of the TAs in Europe are at low altitudes and appeared to be interfering with the flight profiles of modern aircraft types. If the TA was raised to 10 000 ft or higher, the altimeter reference setting would take place at a time when cockpit workload was lower. It is agreed, of course, that option 2 gives maximum harmonisation. Furthermore, the negative impact of option 3 is reflected in Annex A.1 to the PIA.

**B. Appendix 1 - DOCUMENT CONTROL**

p. 12-14

comment

12

comment by: *Christoph Gilgen*

I fail to understand why a flexible option (Option 3) is less costly than a fully harmonized pan-European solution? This is not really understandable to me. If everybody does the same - we get synergies and common action items (over the borders).

And why is 18000 Feet "most challenging in the short term"? Again very



	strange statements.
response	<p><i>Noted</i></p> <p>Looking at the total cost of a solution it is not sufficient to evaluate the implementation cost only. Also the relative costs/savings in the long term have to be considered. Providing the flexibility for ANSPs to determine the TA according to their local constraints is considered advantageous in the long term rather than being forced to accept a level that, for instance for reasons of capacity, may impose restrictions during the operational phase.</p>

comment	<p>13 <span style="float: right;">comment by: <i>Christoph Gilgen</i></span></p> <p>Question: Isn't there an error in your statement? Do you really want to say that a HETA of 18000 ft is less favourable than the "status quo", which is frankly a mess? Or would you like to say .....a HETA of 18000 ft is less favourable than the flexible solution (above 10000 ft), meaning Option 3?</p>
response	<p><i>Noted</i></p> <p>If this comment refers to chapter 6.2.2 of the PIA: it is stated that option 2 is the most favourable for airspace users but the least favourable for most States and ANSPs. This is due to the fact that with option 2 there is no room for the States and/or ANSPs to consider local restrictions in the determination of the TA.</p>

## B. Appendix 1 - EXECUTIVE SUMMARY

p. 13-15

comment	<p>42 <span style="float: right;">comment by: <i>BELGOCONTROL</i></span></p> <p><b><u>The Problem</u></b> The fact that some TA's do not adequately take into account terrain clearance and minimum safe altitude cannot be a reason to bring the TA's above 10.000 ft in the whole area. Each TA should take into account terrain clearance and minimum safe altitude, where necessary, TA's may differ to accomplish the safety criteria's.</p> <p><b><u>The Challenge</u></b> We don't know yet which new navigation and separation methods SESAR will bring, we do certainly not know what the outcome of such new methods will be. It is according to BELGOCONTROL too ambitious to determine a prescribed TA based on these possible criteria.</p> <p><b><u>Multi-criteria analysis</u></b> BELGOCONTROL cannot support this Multi-criteria Analysis method. Indeed results are really in function of the weighting score. For instance, the "Ease of Operational Implementation" field the score for option 1 is set to 4 while the this <b>(do nothing)</b> scenario in our opinion should be the easiest thus scoring 5.</p>
---------	---

This results for option 1; for the un-weighted table in a total of 16 (= equal score with option 3) and for the weighted table the resulting end score becomes 64,5 resulting in option 1 being **the best**.

**Belgocontrol cannot accept this method because the slightest change in interpretation of even 1 criteria leads to a completely other total ranking as proved above.**

#### Recommendations

BELGOCONTROL deplores that the HETA TF did not study the possibility of a TA at 5000 ft or 6000 ft, and can therefor not approve this recommendation. BELGOCONTROL is in favour of option 1, do nothing. BELGOCONTROL recommends that a study is made for a harmonised TA of 5000 ft to be implemented in areas where such a TA is possible taking into account terrain clearance and minimum safe altitude. In areas where this is not possible due to terrain, a higher TA may be applied.

response *Noted*

See response to comment No 27.

Additional considerations: It should be noted that option 1 is not a literally 'do nothing' option. Option 1 means that 'no regulatory action' is taken. While for an individual ANSP this indeed may mean the same thing, it is, however, assumed that in the course of implementation of the FABs also discussion will take place amongst the members on the harmonisation of the transition altitude. In that case — and since amongst the members most likely a compromise will have to be reached — it cannot be included that there are some operational issues to be solved. For this reason it was considered as appropriate not to allocate the weighting score 5 to it.

Considering the responses received to the questionnaire the scoring was adapted in such a way that a bigger difference in cost between option 1 and options 2 & 3 was considered.

The fact that a small modification in the scores and the weighting may lead to different results is caused by the fact that there was indeed not a big difference between the individual options. Of course each stakeholder would apply their own scoring to the various options. This, however, was not the intention of a Regulatory Impact Assessment which has to take into account as many stakeholders as possible.

As regards the study for a TA at 5 000 or 6 000 ft: please refer to the answer to comment No 50.

comment 63

comment by: *DFS Deutsche Flugsicherung GmbH*

The EASA NPA 2012-01 clearly takes position for the implementation of a higher transition altitude (TA). This approach appears to be onesided, neglecting very important facts: We miss a precise analysis of the increased number of flights which have to be provided with a QNH and of the technical environment which has to be re-designed.

response *Noted*

This statement is interpreted as support for option 1 which will be reflected in the chapter 7.2 of the PIA.

As to the number of flights affected by QNH adjustments, the Feasibility Study for Transition Altitude Change in Northern Europe provided the following

information:

— CFMU data from the peak day of 2002 with a total traffic count of 27 796 flights indicated that only 7.1 % of the flights (1 976 flights) were cruising between FL030 and FL100. Furthermore, most of these flights were conducted between city pairs less than 200 NM apart, which reduced the QNH adjustments that would be required over a longer sector.

— During the busiest week of 2008 (23 to 29 June) there was an average of 4 300 flights per weekday with only 6 % (261 flights) between FL050 and FL100 and only 22 % (947 flights) between FL050 and FL180 (in the 4 States subject to the study: Estonia, Finland, Norway and Sweden).

In the week from 20 to 26 April 2009 an average of 3 552 flights was conducted per weekday with 4 % (150 flights) between FL050 and FL100 and 17 % (612 flights) between FL050 and FL180 (again in the area subject to the study).

## B. Appendix 1 - 2. defining the problem - 2.1 Safety occurrences

p. 21

comment

43

comment by: *BELGOCONTROL*

Errors in altimeter setting is known to all ANSP's. The question is: shall a common, harmonised TA above 10000ft resolve these erroneous altimeter setting or is it sufficient to have a harmonised TA.

response

*Noted*

The aim of putting the TA at an altitude above 10 000 ft was to remove it from the busiest phases of flight. By moving it to a less busy phase of flight, the risk of a mis-setting of the altimeter or forgetting to set it to the proper value was expected to diminish.

comment

59

comment by: *DFS Deutsche Flugsicherung GmbH*

Setting the altimeter from actual QNH to standard (FL) and vice versa still has to be done, even if we implement a higher transition altitude, only at a different stage of flight. Errors still may occur and can not be avoided in the future.

response

*Noted*

While it is indeed true that errors cannot be totally avoided, the risk of such errors was expected to be lower if the action itself took place in a less busy phase of flight.

comment

60

comment by: *DFS Deutsche Flugsicherung GmbH*

Changing the altimeter setting at the flight deck isn't such a "big deal", it is just pushing or pulling a button and changing to a preselected value which has been put into the system during a rather non-critical phase of flight or even before

	start-up. This subject seems to be a bit over-emphasized.
response	<p><i>Not accepted</i></p> <p>Even if it is only a simple action, the consequences of not executing it can be severe. It is expected that the risk of mis-setting the altimeter or of forgetting to change the reference system is lower if the action takes place in a less critical phase of flight.</p> <p>The UK CAA Level Bust Working Group previously analysed 626 reported level busts and found that 68 (10.9 %) of these were caused by altimeter mis-setting. It is not to say that with a higher TA such events will not occur anymore. But since the altimeter reference setting will take place at a phase of flight where the cockpit workload is lower there is a chance that the number of occurrences can be reduced.</p>

comment	<p>67 <span style="float: right;">comment by: <i>London Luton Airport Operations Ltd</i></span></p> <p>2.1 the fact that the IFALPA considered a revision of the TA indicates a consideration for the options to be studied, including 18,000 feet. the immediate concern with a lower TA is that as aircraft performance improves, operations such as CCo and CDO arbecome more common and airspace changes permit such operations, the altitude of 10,000 feet will give the same concerns in the future as the lower levels set today.</p>
response	<p><i>Noted</i></p> <p>Your concerns with the lower altitude are reflected in Annex A.5, option 3, to the PIA.</p>

<b>B. Appendix 1 - 2. defining the problem - 2.2 Existing Rules &amp; Regulations</b>	p. 21-22
---	----------

comment	<p>61 <span style="float: right;">comment by: <i>DFS Deutsche Flugsicherung GmbH</i></span></p> <p>A procedure which has been proven to be safe and efficient throughout decades can not all of a sudden be considered to be inefficient and outdated without precise justification.</p>
response	<p><i>Not accepted</i></p> <p>As an indication of the level of the problem in one State only, the UK CAA Level Bust Working Group previously analysed 626 reported level busts and found that 68 (10.9 %) of these were caused by altimeter mis-setting. It is not to say that with a higher TA such events will not occur anymore. But since the altimeter reference setting will take place at a phase of flight where the cockpit workload is lower there is a chance that the number of occurrences can be reduced.</p>

comment	68	comment by: <i>London Luton Airport Operations Ltd</i>
	2.2 - it is time to modernise and progress the regulation to keep up with industry developments, aircraft performance, on board and ANSP technologies and prepare to meet the environmental demands for aviation. The industry requires the framework to enable the ability to perform to safety, capacity and environmental requirements that growth will force through the growth of the next 20-30 years.	
response	<i>Noted</i>	

<p><b>B. Appendix 1 - 2. defining the problem - 2.2 Existing Rules &amp; Regulations -</b>  <b>2.12.1 Mismatch of modern flight profiles with current TAs</b></p>	p. 22-23
---	----------

comment	46	comment by: <i>BELGOCONTROL</i>
	<p>most of the SID &amp; STARS extend above 10000ft and even above 18000 ft. Consequently, there will still be the need for a change from altitude to FL and vv, also when the TA is set above 18000ft. bullet 4 of §2.2.1 is for BELGOCONTROL no argument.</p> <p>During the critical phase of the flight, it will still be necessary to change from regional QNH to local QNH and thus the workload in the cockpit will remain the same, again no argument.</p>	
response	<p><i>Noted</i></p> <p>One of the aims of setting the TA at a higher level was to move the action of changing the altimeter reference setting to a less critical phase of flight.</p>	

comment	69	comment by: <i>London Luton Airport Operations Ltd</i>
	<p>Agree with the last two bullet points, the following statement applies to both. These risks re known to industry and a number of industry reports have identified the potential for a solution or mitigation of the risk. The risk potential must be reduced.</p> <p>London Luton Airport Operations Ltd is supportive of the intent to harmonise the TA in recognition of the potential to make safety improvements.</p>	
response	<p><i>Noted</i></p> <p>See the response to comment No 64.</p>	

**B. Appendix 1 - 2. defining the problem - 2.3 Current ATM Environment -  
2.3.1 Multitude of TAs across Europe**

p. 23

comment	70	comment by: <i>London Luton Airport Operations Ltd</i>
	It is now 2012 and nothing has changed a safety impact assessment today will identify an elongated risk developing.	
response	<i>Noted</i>	

comment	78	comment by: <i>STASA - Italy</i>
	With reference to the paragraph n 2.3, we share that in <i>many cases ... change in the altimeter setting will no longer be required because of the higher Transition Altitude</i> . However, it should also be considered that for a lower number of cases (long-haul flights conducted at altitudes below the new higher Transition Altitude), changes in the altimeter setting will be necessary along the route to allow for different values of QNH of areas far from each other ("area QNH" ?).	
response	<i>Accepted</i> This is reflected in Annex A.1 and A.4 to the PIA.	

**B. Appendix 1 - 2. defining the problem - 2.4 Problem Definition**

p. 24

comment	38	comment by: <i>Deutscher Aero Club e.V. (DAeC)</i>
	This potential confusion is multiplied for light GA and Air Sports pilots as they tend to operate close to the TA, crossing the transition altitude many times per flight. While the risk of CFIT for VFR pilots is comparatively small the air space violation risk due to different TA and different altimeter setting requirements (QNH vs Standard) is larger.	
response	<i>Noted</i> See the response to comment No 34. The safety impact implied in your response will update Annex A.1 to the PIA.	

comment	47	comment by: <i>BELGOCONTROL</i>
	the complete document focuses on the workload in the cockpit. What about the workload of the controller? Was there any study made on the workload increase	

	for the controller?
response	<p><i>Not accepted</i></p> <p>The detailed impact analysis of Annex A.3 of the PIA looked at impact on the ATCO. For traffic figures please see response to comment No 63.</p>

<b>B. Appendix 1 - 3. policy Objectives - 3.1 General Objective</b>
---

p. 25
-------

comment	<p>79 <span style="float: right;">comment by: <i>STASA - Italy</i></span></p> <p>We fully agree with the "Policy (General, Specific and Operational) Objectives" listed in paragraph n 3 of the Preliminary Impact Assessment (P.I.A.).</p>
response	<i>Noted</i>

<b>B. Appendix 1 - 3. policy Objectives - 3.2 Specific Objectives</b>
---

p. 25
-------

comment	<p>48 <span style="float: right;">comment by: <i>BELGOCONTROL</i></span></p> <p><i>SPEC01: To reduce the degree of risk associated with incorrect setting of the altimeter reference pressure.</i></p> <p>On the contrary, the introduction of higher TA's, will result in additional altimeter setting changes thus increasing the possibility of incorrect altimeter settings</p>
response	<p><i>Not accepted</i></p> <p>This was considered in the detailed impact analysis for instance in Annex A.2 and A.4. While the number of adjustments may increase, the changes of pressure settings to be performed are likely to be smaller than those from QNH to standard pressure, something that pilots have suggested are easier to deal with and that are likely to result in a much smaller altitude differential if missed. Moreover, it was assessed that the need for more frequent changes rather than a one-shot action could actually reduce the risk of operating for an extended period on the wrong setting.</p>

comment	<p>71 <span style="float: right;">comment by: <i>London Luton Airport Operations Ltd</i></span></p> <p>London Luton Airport Operations Ltd supports the specific objectives. In addition it should be noted that environmental objectives, second the safety,</p>
---------	---

	should also be considered and defined.
response	<i>Noted</i> The increase in the 'efficiency of operational procedures' as stated in the specific objective 2 is seen as a contributing factor to environmental benefits. Furthermore, the detailed impact analysis in Annex A.6 covers environmental aspects.
comment	79 ❖ <span style="float: right;">comment by: STASA - Italy</span>  We fully agree with the "Policy (General, Specific and Operational) Objectives" listed in paragraph n 3 of the Preliminary Impact Assessment (P.I.A.).
response	<i>Noted</i>

<b>B. Appendix 1 - 3. policy Objectives - 3.3 Operational Objectives</b>	p. 25
--	-------

comment	2 <span style="float: right;">comment by: FFVV - French Gliding Association</span>  The operationnal objective of reducing sailplane pilot workload would be better respected with an 18000 ft transition altitude.
response	<i>Noted</i> This is interpreted as your support for option 2 and will be considered in the comparative assessment in chapter 7.2 of the PIA.
comment	32 <span style="float: right;">comment by: Deutscher Aero Club e.V. (DAeC)</span>  OPS01: Agree. An earlier setting of the relevant QNH leads to a better situational awareness in regards to terrain and obstacles, as well as determining the real altitude available for CDA.  OPS03: Agree. By raising the HETA to 18.000ft most light GA and Air Sport operation would be flown on QNH setting thereby abolishing almost all risk of wrong altimeter setting.
response	<i>Noted</i> This is interpreted as your support for option 2 and will be considered in the comparative assessment in chapter 7.2 of the PIA.
comment	49 <span style="float: right;">comment by: BELGOCONTROL</span>



*OPS01: To minimise the number of incidents of loss of separation between aircraft or risk of CFIT caused by incorrect altimeter settings.*  
*OPS02: To minimise the number of occurrences of increased controller/pilot workload arising from incorrect altimeters settings.*

On the contrary, the introduction of higher TA's, will result in additional altimeter setting changes thus increasing the possibility of incorrect altimeter settings. as a result the number of incidents as well as the workload related to the incorrect setting may increase.

response *Not accepted*

These issues are reflected in Annex A.1, A.3 and A.4 to the PIA.  
 While the number of adjustments may increase, the changes of pressure settings to be performed are likely to be smaller than those from QNH to standard pressure, something that pilots have suggested are easier to deal with and that are likely to result in a much smaller altitude differential if missed. Moreover, it was assessed that the need for more frequent changes rather than a one-shot action could actually reduce the risk of operating for an extended period on the wrong setting.

comment 79 ❖

comment by: STASA - Italy

We fully agree with the "Policy (General, Specific and Operational) Objectives" listed in paragraph n 3 of the Preliminary Impact Assessment (P.I.A.).

response *Noted*

## **B. Appendix 1 - 4. POTENTIAL Policy Options - 4.1 General Remarks**

p. 26

comment 50

comment by: BELGOCONTROL

why is there no option for a TA at 5000 ft or 6000 ft as requested by some member states??? We could easily have a harmonised TA over Europe for these altitudes except over high terrain.

To study also this option was a recommendation at ANT/32 i.e:  
*"to study an altitude below 10.000' on the basis of a sub-regional (FAB) application."*

response *Noted*

A TA at 5 000 or 6 000 ft (as existing already in Germany for instance) would not enable operational objective 3 as described in the PIA: To move required altimeter reference setting procedures conducted by flight crew to a phase of lower workload (i.e. higher altitude).

In the working paper submitted to ANT/32 it was already stated that 'transition altitudes below 10 000 ft under a sub-regional concept will only be considered if the customer preferred alternatives, based on the outcome of the studies ... prove unacceptable'.

**B. Appendix 1 - 4. POTENTIAL Policy Options - 4.2 Option 1 – No Regulatory Intervention (Status Quo)**

p. 26

comment 51

comment by: BELGOCONTROL

BELGOCONTROL deplores that the HETA TF did not study the possibility of a TA at 5000 ft or 6000 ft, and can therefore not approve this recommendation. BELGOCONTROL is in favour of option 1, do nothing. BELGOCONTROL recommends that a study is made for a harmonised TA of 5000 ft to be implemented in areas where such a TA is possible taking into account terrain clearance and minimum safe altitude. In areas where this is not possible due to terrain, a higher TA may be applied.

As BELGOCONTROL cannot agree with a TA at 18000 ft (option 2) nor a TA above 10000ft (option 3) we can only support option 1

response *Noted*

With respect to your comments related to a lower value for the TA see the answer to comment No 50.

**B. Appendix 1 - 4. POTENTIAL Policy Options - 4.3 Option 2 – Implementing Rule mandating a HETA at 18,000 ft**

p. 26-27

comment 82

comment by: STASA - Italy

We share both the introductory notes, and the articulation of the 3 Options (with a minor consideration, expressed below, for Option 3) set out in paragraph 4 of the P.I.A..

response *Noted*

comment 98

comment by: Tyler Clark - Transport Canada Civil Aviation

Transport Canada recommends that a Harmonized European Transition Altitude (HETA) of 18,000 ft be considered as the most desired long-term solution for addressing multiple issues.

response *Noted*

Your support for option 2 will be considered in the comparative assessment in chapter 7.2 of the PIA.

**B. Appendix 1 - 4. POTENTIAL Policy Options - 4.4 Option 3 – Implementing Rule prescribing common criteria for the determination of the TA at or above 10,000 ft** p. 27-28

comment	<p>39 <span style="float: right;">comment by: <i>Deutscher Aero Club e.V. (DAeC)</i></span></p> <p>4.4 Pont 1.</p> <p>a. what about mountainous areas?</p> <p>b. What happens at FAB boundaries?</p> <p>c. This is like Option 1 "do nothing".</p>
response	<p><i>Noted</i></p> <p>a) Option 3 allows for values of a TA higher than 10 000 ft which could be applied in mountainous areas.</p> <p>b) Option 3 foresees coordination across FAB boundaries with the aim to find a common solution. Should a single TA not be achievable, transfer procedures would have to be established similar to current ones where there is a highly fragmented situation with respect to TAs.</p> <p>c) Option 3 is not considered as the same as option 1:</p> <ul style="list-style-type: none"> <li>– a minimum level of 10 000 ft is ensured;</li> <li>– coordination with adjacent units will be prescribed in the procedure of establishing a TA. This already may lead to a certain level of harmonisation. As stated in 4.4 of the PIA, the aim of the coordination procedure would be to agree on a common TA.</li> </ul> <p>Within Member States a single TA above 10 000 ft shall be established, already reducing fragmentation.</p>

comment	<p>62 <span style="float: right;">comment by: <i>DFS Deutsche Flugsicherung GmbH</i></span></p> <p>An implementation of different transition altitudes just above 10.000 ft does not make sense at all because it would generate the same "fragmentation" of TAs among Europe as we have today, but in higher altitudes.</p>
response	<p><i>Noted</i></p> <p>The aim of this activity is twofold: to establish higher TAs with greater harmonisation.</p> <p>The fact that the TA has to be adapted could also lead to a process of harmonisation by ANSPs discussing the best solution.</p> <p>To mitigate the possibility of perpetuating today's level of fragmentation, it would be the intention of the regulatory action to prescribe procedures to harmonise TAs and with the aim to move towards a single TA as far as practicable.</p> <p>The minimum level of 10 000 ft ensures that the TA in most cases will be higher than today, thereby complying with the airspace users request to move the altimeter reference setting procedure to a phase of lower cockpit workload.</p> <p>This potential shortcoming of option 3 is reflected in the PIA annexes.</p>

comment	83	comment by: <i>STASA - Italy</i>
	With reference to paragraph 4.4, sub.paragraph 2, of the P.I.A., we believe that among the non-binding measures (AMC and/or GM) to the IR, it may be appropriate to include, if necessary, provisions related to possible altimeter adjustments for long-haul flights conducted at altitudes lower than the Harmonized European Transition Altitude.	
response	<i>Noted</i>	
	Your comment is noted and will be considered should further regulatory activities are undertaken.	

comment	99	comment by: <i>Tyler Clark - Transport Canada Civil Aviation</i>
	A harmonized, regulated implementation of a single Transition Altitude (TA) for the European airspace would significantly benefit the implementation of more complex 4D air traffic management vertical performance paths/trajectories of aircraft. A single TA would simplify the computation logic of the aircraft navigation systems needed to support performance based navigation.	
response	<i>Accepted</i>	
	Your input related to aircraft trajectories will be considered in the updated PIA in chapters 5.2.5 and 5.3.5 as well as in Annex A.5.	

**B. Appendix 1 - 5. Impact Analysis - 5.1 Option 1 – No Regulatory Intervention (Status Quo)**

p. 29

comment	72	comment by: <i>London Luton Airport Operations Ltd</i>
	in the summary 5.1 there is no representation from aerodromes. As stakeholders who are accountable for the airspace around the aerodrome, with weither in house or contracted ANSP services, there should be a consideration of aerodrome safety, capacity and environmental performance an factors.	
	Ultimately there will be an increase in traffic and in a risk assessment with the existing risk today, which could ultimately lead to catastrophe, is the increased likelihood of an accident being realised.	
	5.1.5 - there will be a cost to aerodromes under this option as a stakeholder as CDO and CCO would be limited, capacity may also be effected amongst the other measures intended under SESAR and other airspace dvelopemnts. If another airport in the region or adjacent state, not as congested, is able to perform (for example) the aerdrome restricted by no change become expensive to operate from.	

response *Noted*

**B. Appendix 1 - 5. Impact Analysis - 5.2 Option 2 – Implementing Rule  
Mandating a HETA at 18,000 ft**

p. 30-31

comment 3 comment by: *FFVV - French Gliding Association*

The highest transition altitude is a better and safer solution for sailplane pilots, who generally work with ATC with a sea level altimeter setting, especially in mountaneous areas such as French Alps. A transition layer around 10 000 ft would be less interesting.

response *Noted*

comment 14 comment by: *Christoph Gilgen*

A higher "Routine" could be achieved (see the US and/or Canada).

response *Noted*

Your comment is interpreted as support for option 2; it will be considered in the comparative assessment in chapter 7.2 of the PIA.

comment 31 comment by: *Deutscher Aero Club e.V. (DAeC)*

response *Noted*

comment 73 comment by: *London Luton Airport Operations Ltd*

5.2 - there is no mention of aerodromes as a recognised stakeholder. Aerodromes are defined as the bottleneck in other reports concerning issues such as CDM or other airspace developments. Here there is no recognition or consideration in the impact assessment. Aerodromes, more often operating as private businesses, are affected by all relative issues which relate to the safety performance of aircraft operators and ANSP's.

5.2.1 There is scope for technological advances to assist the automation (accepted this is not in place today) which may be adopted into SOP's and further reduce the frequency for pressure setting changes.

response *Noted*

comment	84	comment by: STASA - Italy
	<p>We share the <i>Impact Analysis</i> as summarised in sub-paragraphs 5.1 and 5.2 of the P.I.A., (and more fully described in Annex A), for Options 1 and 2. In particular, we fully share the considerations with regard to the impact related to the flight crews and the ATCO with the Option2 (sub-paragraphs 5.2.3 and 5.2.4) with the exception that we are not sure that a major phase of specific training could be necessary.</p>	
response	<p><i>Noted</i></p> <p>The amount of training required is not explicitly stated. However, some training can be expected to be required. This was also confirmed by the responses received to the questionnaires.</p>	

comment	100	comment by: Tyler Clark - Transport Canada Civil Aviation
	<p>It should be considered that half the atmosphere exists below nominally 18000 ft. Above this altitude, the atmospheric conditions are relatively stable over broad geographic regions, allowing for consistent relative altitude keeping between aircraft. Below this altitude, the atmosphere is subject to more local variations in pressures due to weather systems, and geographic features such as mountains and large bodies of water. There is extensive operational experience from Canada and the United States where an 18,000 ft TA has already been successfully implemented.</p>	
response	<p><i>Noted</i></p>	

comment	101	comment by: Tyler Clark - Transport Canada Civil Aviation
	<p>Flight crew procedures, particularly for operators from Canada and the United States going into Europe, would be simplified if operations could be more consistent globally. There would no longer be a need to deal with different TAs within European airspace.</p>	
response	<p><i>Noted</i></p>	

comment	104	comment by: Boeing
	<p>Page: 12 Para 5.2.1. - Safety impact</p> <p>The text in this section states:  <i>"... procedures for steep pressure gradients would need to be developed."</i>          Boeing would like clarification from EASA on what constitutes a steep pressure gradient, and what specific crew procedures will need to be developed.</p> <p>JUSTIFICATION: Clarification is needed with regard to specific procedure</p>	

development that EASA is referring to in this section of the ANPA.

response *Accepted*

A steep pressure gradient results in a very rapid change in air pressure that may make the concept of area QNH extremely challenging. It is not so much the aircrew for which procedures would have to be established but for the services defining the area QNH to be applied.  
Therefore, the consequences of steep pressure gradients are noted in the PIA in Annex A.2 which relates to the ANSPs.

**B. Appendix 1 - 5. Impact Analysis - 5.3 Option 3 – Implementing Rule prescribing common criteria for the determination of the TA at or above 10,000 ft**

p. 31-32

comment

15

comment by: *Christoph Gilgen*

Yes, this is true, less aircraft affected. But, by lowering the HETA from 18000 ft to 10000 ft (or in-between) would expose much more aircraft to additional problems of the determination of the True Altitude above terrain (compared to 18000 ft). This means the pilots must constantly make sure that, by flying with 1013, they are adequately separated from terrain (under own navigation).

response

*Noted*

It is of course assumed that terrain clearance would be taken into account when deciding on the TA to be applied.

comment

45

comment by: *Deutscher Aero Club e.V. (DAeC)*

Agree

response

*Noted*

comment

74

comment by: *London Luton Airport Operations Ltd*

The safety, capacity and environmental issues which are a risk today would be retained as the 10,000 feet TA is not sufficient to envelop the future performance of aircraft.

response

*Noted*

Your comment will update chapter 5.2.5 of the PIA as well as Annex A.5.

comment

85

comment by: *STASA - Italy*

We agree, in general, also with the *Impact Analysis* summarised in subparagraph 5.3 of the P.I.A. (and more fully described in Annex A) for Option 3. However, we believe (subparagraphs 5.3.3 and 5.3.4, in particular) that the comparative advantages vs disadvantages of Option 2 and Option 3 may vary, even widely, depending on the magnitude of the gap between 18,000 FT (Option 2) and the effective Harmonized Transition Altitude (Option 3) to be adopted.

response *Noted*

Your comment will be taken into account when updating chapter 6.3.2 of the PIA.

**B. Appendix 1 - 6. Comparison of options - 6.2 Individual Assessment of the Options**

p. 33

comment 86

comment by: STASA - Italy

In relation to the comparison of the Options listed in paragraph 6 of the P.I.A., and subject to come back to the issue in a later comment on the content of Annex B, we agree in general with the content of the text presented.

response *Noted*

**B. Appendix 1 - 6. Comparison of options - 6.2 Individual Assessment of the Options - 6.2.2 Option 2 - Implementing Rule mandating a HETA at 18,000 ft**

p. 33-34

comment 105

comment by: Boeing

The text states:

*"... Enforcing a specific harmonised TA would present considerable implementation challenges, particularly in some States, which would be difficult to overcome. Furthermore, linked to this aspect, this is thought likely to be the most costly option to implement. Option 2 is expected to be the most favourable for airspace users but the least favourable to most States and ANSPs."*

Boeing does not see any validation of the excessive cost to implement this option and, therefore, sees no justification to identify this as the least favorable option for States and ANSPs. If the TA will be changed from the current altitude, a change to 18.000 ft would constitute an equal cost.

JUSTIFICATION: Clarification is needed as to what assumptions the statement is based on.

response *Noted*



The aspect of cost is looked at in a relative way, meaning that the options described are weighted against each other. No absolute cost was considered in this PIA, mainly because of the absence of sufficient information. Since option 2 does not take into account local considerations it is expected to be more costly than option 3 since there is no way of adapting it to the local situation. This could mean that in terms of efficiency or capacity it will not be possible to implement the optimum solution which would in fact mean increased costs. Maybe looking at the implementation cost the two options would be the same; by looking at the cost of operations there is expected to be a difference. However, as the table in Annex B.2.2 indicates the difference between options 2 and 3 is considered to be minimal with the two values spaced by only 0.5 points.

In the answers to the questionnaire distributed together with the A-NPA one stakeholder (small ANSP) estimated the total cost at EUR 7.1 million. This would mean a significant cost of implementation if extended pro rate across all ANSPs and a cost that would have to be borne substantially by the airspace user community. Cost is an impact that demands further in-depth analysis before the final regulatory approach can be determined.

**B. Appendix 1 - 6. Comparison of options - 6.3 Comparative assessment of the options**

p. 34

comment

53

comment by: *BELGOCONTROL*

there is a comparison of option 2 against 1 and 3 against 2. Why is there no comparison of option 3 against 1

response

*Noted*

Because it is considered that the benefits and disadvantages of option 3 compared to option 1 will be the same as for option 2 compared to option 1. This is stated in the introduction of Annex A 'Detailed Impact Analysis'. However, especially with regard to the cost estimates contained in the responses to the questionnaire it was deemed appropriate to add a comparison between option 3 and option 1 to the PIA.

**B. Appendix 1 - 6. Comparison of options - 6.3 Comparative assessment of the options - 6.3.2 Comparison of Option 2 against Option 3**

p. 35

comment

16

comment by: *Christoph Gilgen*

The risk of Option 3 is that "harmonization" is maybe not fully achieved. For this Option 2 is much better (for sure harmonization will be achieved).

response

*Noted*

That is the reason why option 2 in table B.2.2 achieves the best score with respect to 'Consistency with the aims of the EU Policies and Regulations'.

comment 41 comment by: *Deutscher Aero Club e.V. (DAeC)*

Flexibility is a key issue in aviation but in this case it reduces the overall win.

response *Noted*

That is of course true from the airborne perspective but may not be true for the ground installations.

## B. Appendix 1 - 7. CONCLUSIONS

p. 36-37

comment 17 comment by: *Christoph Gilgen*

I am not sure that Option 2 would really create a lot of problems between the Stakeholder groups, as is alleged? The potential for "problems" and disagreement is much higher for Option 3 (my opinion).

response *Noted*

The fact that there is no room for considering local specificities is considered as the 'difficult' aspect in option 2. In option 3 there is always the possibility for stakeholders to take their specific situation into account should it really be impossible to reach an agreement during the coordination with adjacent service providers.

comment 55 comment by: *BELGOCONTROL*

"Developing an Implementing Rule to prescribe common criteria for the determination of TAs at or above 10,000 ft (Option 3) appears to be more favourable than maintaining the 'status quo' (Option 1)"

this statement only appears in the conclusion. Nowhere in the document we can find any prove of this. No comparison between option 1 and option 3 has been made in this document!

response *Noted*

Especially with regard to the cost estimates contained in the responses to the questionnaire it was deemed appropriate to add a comparison between option 3 and option 1 to the PIA.

comment 56 comment by: *Military Aviation Authority Finland*

No regulatory intervention (status quo) is the most suitable option for flat countries like Finland. Option 2 (TA 18000ft) increase both ATC and pilot workload, which may have a negative effect on flight safety. Option 3 (TA 10000ft) is also acceptable on MAA point of view, but that option would lead to changes in airspace structure in Finland.

response *Noted*

It is not clear why there would be a difference in ATCO and pilot workload between option 2 and 3. One possibility could be that with option 2 more aircraft would be subject to area QNH and this would increase the workload of the controller. However, if the issuance of the area QNH is built-in into the phraseology (flight XXX identified, QNH is ...) the additional workload per flight could be negligible.

Your comment is interpreted as a preference for option 1; it will be marked in chapter 7.2 of the PIA.

comment 75

comment by: *London Luton Airport Operations Ltd*

5th paragraph - it is clearly identified that the primary safety objectives referred to throughout the document, would not be fully met. The concern here is that cost is the driver and simplification of implementation and not the long term advantages. Specifically if safety is number one priority it should have taken precedence in the recommendations. Where the most critical conditions should be used, the CAA study of level busts in the UK and the example of Graz in the report provided for Eurocontrol should be supportive evidence of the potential, in a busier aviation industry that the likelihood of a serious event will occur or multiple events, in the next 20-30 years.

The 18000 feet TA is conformist with EU policy and regulations and should be considered as a real option for the future due to the potential to meet all safety drivers while offering secondary benefits.

response *Noted*

The results of the UK Level Bust Group and the example of Graz airport will be used to update chapter 2.1 of the PIA.

comment 87

comment by: *STASA - Italy*

We share, in general, the Conclusions and the Recommendations set out in paragraphs 7 and 8 of the P.I.A., including those indicating the need to further deep some specific issues.

response *Noted*

comment	21	comment by: <i>skyguide Corporate Regulation Management</i>
	<p><i>Skyguide supports the recommendation of the HETA TF Impact Assessment (Preliminary Impact Assessment provided as Appendix 1 to this A-NPA). Skyguide position is built following almost 8 years of a very active participation to first and second task force related to the subject. Our position evolved through time following a steep learning curve and a very concrete and substantiated input from our major ops units. Predominantly, our position was driven by safety considerations – would the imposition of the 18.000ft, as initially intended, really bring safety benefits, or otherwise.</i></p>	
response	Noted	

comment	54	comment by: <i>Deutscher Aero Club e.V. (DAeC)</i>
	<p>8. Recommendations</p> <p>bullet one:</p> <p>disagree, this proposal is a very weak attempt to solve a problem by putting the TA at new higher uncoordinated levels.</p> <p>bullet two:</p> <p>second</p>	
response	<p>Noted</p> <p>Parts b and c of option 3 will require coordination between adjacent units when it comes to the definition of the TA. This should result in a coordinated definition of a TA across airspace boundaries and as such would facilitate a coordinated approach to TA setting.</p>	

comment	57	comment by: <i>BELGOCONTROL</i>
	<p><u>Recommendations</u></p> <p>BELGOCONTROL deplores that the HETA TF did not study the possibility of a TA at 5000 ft or 6000 ft, and can therefore not approve this recommendation. BELGOCONTROL is in favour of option 1, do nothing. BELGOCONTROL recommends that a study is made for a harmonised TA of 5000 ft to be implemented in areas where such a TA is possible taking into account terrain clearance and minimum safe altitude. In areas where this is not possible due to terrain, a higher TA may be applied.</p>	
response	<p>Noted</p> <p>The aim of this initiative was not only to harmonise the TA but also to raise it to a level that would remove it from that phase of a flight where workload in the cockpit was the highest. By moving the altimeter setting procedure to a less busy phase of flight the likelihood of mis-settings could be reduced.</p>	

comment

87 ❖

comment by: STASA - Italy

We share, in general, the Conclusions and the Recommendations set out in paragraphs 7 and 8 of the P.I.A., including those indicating the need to further deep some specific issues.

response

*Noted*

comment

102

comment by: Norwegian Air Traffic Controller Association

The Norwegian Air Traffic Controllers Association (NATCA) does not agree with the conclusion that defining a transition altitude above 10.000ft is indeed standardisation. There is a lack of ambition in the recommendation, and can in extreme cases lead to the same fragmentation between nations/FABs with regard to transition altitude, but moving the problem above 10.000ft. NATCA is a strong supporter of a single transition altitude for all of Europe, and 18.000ft is the alternative, that solves most problems associated with transition altitude.

response

*Noted*

The problem of the TA is twofold: it is considered too low and is fragmented. Raising the lowest possible TA to 10 000 ft would solve at least one of the two problems, namely that for modern aircraft operations the TA is too low and the change of the altimeter reference takes place at a very busy time of flight.

Furthermore, option 3 would prescribe coordination within and beyond FABs in order to achieve a common TA as much as possible. This should lead to a self-driven harmonisation process.

Your preference for option 2 will be marked in chapter 7.2 of the PIA.

## **B. Appendix 1 - DETAILED IMPACT ANALYSIS - A.4 Impact on the Flight Crew**

p. 47-48

comment

106

comment by: Boeing

Table – Section A.4 -- Impact on the Flight Crew  
Option 2 - DISADVANTAGES/COSTS FOR FLIGHT CREW

The text states:

*"A modification to the TA may have an influence on the SOP because some SOPs are designed to include altimeter information."*

SOPs continually change, and this change will not (or hardly) impact crew actions. The action is taken when either cleared above/below TA/TL, or when passing. As the action is taken at a different time, but serves the same function, crew performance is not affected.

JUSTIFICATION: Clarification is needed on the estimation of "disadvantages."

response *Not accepted*

According to flight crews it makes indeed a difference if the same action is performed in different phases of flight. One of the aims of this initiative is to move the action of changing the altimeter reference setting away from the busiest phase of flight.

comment 107 comment by: Boeing

Table – Section A.4 -- Impact on the Flight Crew  
Option 2 - DISADVANTAGES/COSTS FOR FLIGHT CREW

The text states:  
*"Training requirements will have to be addressed."*  
We maintain that no specific training for this issue is required.

JUSTIFICATION: Clarification is needed on the estimation of disadvantages.

response *Not accepted*

This contradicts to some statements in the responses to the questionnaire where aircraft operators claim that there will be significant costs for training and documentation.

<b>B. Appendix 1 - DETAILED IMPACT ANALYSIS - A.5 Economic and Efficiency Impact</b>	p. 49-50
--	----------

comment 108 comment by: Boeing

Table – Section A.5 – Economic and Efficiency Impact  
Option 2 - ECONOMIC AND EFFICIENCY DISADVANTAGES/COSTS  
EDITORIAL COMMENT

The text in this section of the table states:  
*"In sectors handling flights in levels around FL180-200 the efficiency may have the potential to decrease which in some cases already may be bottlenecks."*  
and shortly thereafter  
*"In sectors handling flights at levels around FL180-200 the efficiency may have the potential to decrease. This will most severely affect sectors that are now already working at their capacity limit. "*

These disadvantages appear to be the same. We suggest deleting one of them.  
JUSTIFICATION: Duplication error.

response *Accepted*

One of them will be deleted.

**B. Appendix 1 - MULTI-CRITERIA ANALYSIS - B.2 Comparative Analysis -  
B.2.1 Evaluation of the Options**

p. 52-54

comment 90

comment by: STASA - Italy

At the moment, we feel that it could be encouraged, at least as a solution in the short term, the Option 3, compared to Option 2 (perhaps the best in longer-term) and to Option 1; we are therefore in agreement with the ranking deduced from the results of the Multi-Criteria Analysis summarized in Annex B. However, perhaps because we don't know both, either the grounds on which the five individual evaluation criteria were chosen or, especially, the weighting scores were assigned, we have some doubts on this issue. Only to expand a bit on one of these doubts, on one hand we are convinced – and we agree with the Annex B on it – that the fundamental criterion of the "Achievement of Objectives" should be given the maximum (5) score. On the other hand, we can not understand why a very high score (4) was assigned in Annex B to the criterion of "Relative Costs", when we do not even know sufficient elements on "absolute" values of such costs and in is not even excluded from being relatively insignificant for the budget of the stakeholders involved. (Similar considerations may perhaps be made in relation to the score assigned to the criterion of "Likelihood of Stakeholder Buy-In").

response *Noted*

The criteria with which the different options are evaluated are chosen with regard to their relevance when it comes to deciding on the preferred option and its materialisation. Assigning a value for the weighting score expresses the importance of the respective aspect for the decision which option is to be preferred. After safety, cost is clearly a driving factor in defining the efficiency of the operations of a unit. Therefore, the difference in cost between individual options can be considered as a decisive factor when it comes to choosing the preferred option. Therefore, it warrants a high value for the weighting score. Since in this case we are evaluating the relative costs it doesn't really matter if the absolute costs are high. Even a small cost is to be considered — unless of course the decision is taken that in this case cost is not a factor. The PIA will be updated to make the various choices more transparent.

**B. Appendix 1 - MULTI-CRITERIA ANALYSIS - B.2 Comparative Analysis -  
B.2.2 Results of the Un-Weighted Multi-Criteria Analysis**

p. 54

comment 90 ❖

comment by: STASA - Italy

At the moment, we feel that it could be encouraged, at least as a solution in the short term, the Option 3, compared to Option 2 (perhaps the best in longer-term) and to Option 1; we are therefore in agreement with the ranking deduced from the results of the Multi-Criteria Analysis summarized in Annex B.

However, perhaps because we don't know both, either the grounds on which the five individual evaluation criteria were chosen or, especially, the weighting scores were assigned, we have some doubts on this issue.

Only to expand a bit on one of these doubts, on one hand we are convinced – and we agree with the Annex B on it – that the fundamental criterion of the "Achievement of Objectives" should be given the maximum (5) score. On the other hand, we can not understand why a very high score (4) was assigned in Annex B to the criterion of "Relative Costs", when we do not even know sufficient elements on "absolute" values of such costs and in is not even excluded from being relatively insignificant for the budget of the stakeholders involved. (Similar considerations may perhaps be made in relation to the score assigned to the criterion of "Likelihood of Stakeholder Buy-In").

response *Noted*

The criteria with which the different options are evaluated are chosen with regard to their relevance when it comes to deciding on the preferred option and its materialisation.

Assigning a value for the weighting score expresses the importance of the respective aspect for the decision which option is to be preferred.

After safety, cost is clearly a driving factor in defining the efficiency of the operations of a unit. Therefore, the difference in cost between individual options can be considered as a decisive factor when it comes to choosing the preferred option. Therefore, it warrants a high value for the weighting score.

Since in this case we are evaluating the relative costs it doesn't really matter if the absolute costs are high. Even a small cost is to be considered – unless of course the decision is taken that in this case cost is not a factor.

The PIA will be updated to make the various choices more transparent.

**B. Appendix 1 - MULTI-CRITERIA ANALYSIS - B.2 Comparative Analysis -  
B.2.3 Results of the Weighted Multi-Criteria Analysis**

p. 55

comment 90 ❖

comment by: STASA - Italy

At the moment, we feel that it could be encouraged, at least as a solution in the short term, the Option 3, compared to Option 2 (perhaps the best in longer-term) and to Option 1; we are therefore in agreement with the ranking deduced from the results of the Multi-Criteria Analysis summarized in Annex B.

However, perhaps because we don't know both, either the grounds on which the five individual evaluation criteria were chosen or, especially, the weighting scores were assigned, we have some doubts on this issue.

Only to expand a bit on one of these doubts, on one hand we are convinced – and we agree with the Annex B on it – that the fundamental criterion of the "Achievement of Objectives" should be given the maximum (5) score. On the other hand, we can not understand why a very high score (4) was assigned in Annex B to the criterion of "Relative Costs", when we do not even know sufficient elements on "absolute" values of such costs and in is not even excluded from being relatively insignificant for the budget of the stakeholders involved. (Similar considerations may perhaps be made in relation to the score assigned to the criterion of "Likelihood of Stakeholder Buy-In").



response

*Noted*

See the answer above.

**Attachment A to CRD to A-NPA 2012-01**

**PRELIMINARY IMPACT ASSESSMENT (PIA)**

***Harmonised European Transition Altitude (HETA)***

## **DOCUMENT CONTROL**

### **DOCUMENT CHANGE RECORD**

The following table records the complete history of the successive editions of the present document.

<b>Edition number</b>	<b>Edition date</b>	<b>Reason for change</b>	<b>Pages affected</b>
0.1	03-08-11	Creation of the Strawman Draft PIA	All
0.2	05-08-11	Internal review	All
0.3	17-08-11	Joint update OPL/PRO & SES	All
0.4	15-09-11	Update after comments from EASA and HETA TF	
0.5	03-10-11	Update after HETA TF #3	Option 2
0.6	27-10-11	Update during HETA TF #4	All
0.7	07-11-11	Update for HETA #5	All
0.8	30-11-11	Update after HETA #5	3,5,12,15
1.0	21-12-11	Released edition 1.0	
1.1	09-08-12	Update with A-NPA results	All
1.2	10-08-12	Internal EUROCONTROL review	All
1.3	21-08-12	Internal EUROCONTROL review	All
2.0	11-09-12	Released dition 2.0	

<b>Status: Released</b>	<b>Edition No: 2.0</b>	<b>Date: 12 August 2012</b>	<b>Document No: SES/IOP/HETA/PIA/2.0</b>
-------------------------	------------------------	-----------------------------	--

## **executive summary**

### **Background**

As a result of interventions made by representatives of Member States at meetings of the SES Single Sky Committee (SSC), and to determine how to best overcome ATM problems associated with fragmented Transition Altitudes (TA) across Europe, EUROCONTROL and EASA were tasked with evaluating the feasibility and impact of implementing a Harmonised European Transition Altitude (HETA) of 18,000 ft. In order to help policy-makers identify if, and to what extent, EU regulatory action is required, a Preliminary Impact Assessment (PIA) has been chosen as the most appropriate tool with which to examine the issues using readily available information. The Released version 1.0 of the PIA was further consulted with the stakeholders using the EASA Advance Notice of Proposed Amendment (A-NPA) mechanism. The data collected during the A-NPA consultation period was used to update the impact assessment. This report presents the results of the updated PIA following the HETA A-NPA consultation.

It must be noted that the update of this PIA after the A-NPA was performed without involvement of the HETA TF members. The update was performed by EUROCONTROL and EASA experts on the basis of the cooperation agreement between the two organisations.

The updates in the PIA are indicated with shaded text.

### **The problem**

There is potential for confusion and errors on the flight deck, which is caused by the wide variety of TAs used across Europe, the need to change altimeter settings during critical departure and approach phases of flight, and the fact that some TAs do not adequately take into account terrain clearance and minimum safe altitudes. This introduces an operational environment that according to an IFALPA policy statement is unsatisfactory and gives rise to serious operational problems, such as level busts, and consequently in a risk of loss of separation and increased risk of CFIT. The safety issues regarding a low TA were also addressed in a report from the Norwegian Accident Investigation Board, published in 2007.

A significant factor contributing to this situation is the fact that ICAO provisions for the determination of TAs were written in the late 1950s and do not reflect modern flight procedures or set out clear and harmonised criteria for setting TAs. Another factor is a historic lack of coordination between neighbouring ANSPs and States when determining the TA.

### **The challenge**

In regard to the ATM Master Plan, ESP Plus Programme and SESAR, every contribution is needed in order to facilitate for the expected traffic growths the next 20-30 years, and to ensure flight safety enhancement. New methods for navigation and separation will come with SESAR, in addition to present developments with PBN/RNAV/BARONAV and new ATM systems like the Point Merge System. Standardised and harmonised procedures will become a key enabler for simplification of the ATM and flight-deck operational environment, which is a key element to meet the future challenges.

---

### **Policy objectives**

The overall policy objective is to improve safety and efficiency levels associated with the use of TAs across European airspace and, specifically, to reduce the incidences of incorrect settings of altimeters when aircraft pass the TA or Transition Level (TL). This shall be achieved without compromising existing safety levels in other areas.

## Potential policy options

The following policy options have been evaluated in this PIA:

- Option 1 — No regulatory Intervention;
- Option 2 — Implementing Rule to implement a HETA at 18 000 ft;
- Option 3 — Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft.

## Options appraisal

Option 1 would be the easiest and least expensive approach to implement because only local and FAB initiatives would be likely to be deployed. Options 2 and 3 could be costly and challenging to implement in the short term, but the longer-term benefits would significantly outweigh those of option 1. Moreover, option 2 is entirely consistent with the aims of SES, whereas option 1 is not at all consistent.

The PIA analysis also highlights that the costs and disadvantages associated with options 2 and 3 might outweigh the benefits as compared to maintaining the 'status quo', particularly in the short term. Nevertheless, if mitigation for costs and local issues could be found for the short term, option 2 could be considered as a long-term goal through suitable transition measures. In the short term option 3 could provide a more pragmatic regulatory solution than option 2 for the problems associated with TAs across Europe.

## Conclusions

Overall, a multi-criteria analysis of the 3 options produced inconclusive results. As only very limited quantitative data were available even after the A-NPA, the scoring on the cost criterion in particular was only of a qualitative nature, and so further detailed CBA work is required before a preferred option can be determined. Also, the impact on the military — although already considered in the Nordic States feasibility study — needs additional attention.

**In summary**, the HETA TF drew the following conclusions:

- 1) Developing an Implementing Rule to prescribe common criteria for the determination of TAs above 10 000 ft could provide a more pragmatic regulatory option than a single HETA, particularly in the short term.
- 2) Although the results of the multi-criteria analysis do not provide big differences between the options, it can be deduced that, because of the potential short-term costs and implementation challenges, the development of an Implementing Rule to prescribe a HETA of 18 000 ft appears to be less favourable than maintaining the 'status quo'.
- 3) Feedback should be requested from a wider range of stakeholders on the three options evaluated, and to collect quantitative data to confirm the results of this PIA.

The comments received on the A-NPA and the responses received to the questionnaires did not contain information that would indicate the invalidity of the results achieved in the PIA — with the exception of the economic impact (costs). However, even after the public consultation, the available data is still very limited.

Only one cost estimate spanning the whole range of affected areas was received in the responses to the questionnaire. Nevertheless, on the basis of this single input, an increase in the gap between option 1 and the other two options in the multi-criteria analysis with respect to the economic impact was considered justified. This resulted in a slight change to the original scoring of the various options by the HETA TF. As a consequence, both un-weighted and weighted multi-criteria analyses (see B.2.2 below) now show no meaningful difference in the overall scores between the three options.

Mindful of the significant impact, both on the operational environment and the costs involved, the current result of this PIA and A-NPA does not justify a clear decision in favour of one of the options.

### Recommendations

It is recommended that:

- Regulatory action to prescribe common criteria for the determination of TAs above 10 000 feet should be the preferred option for harmonisation of TAs in European airspace.
- Wider views of stakeholders should be sought as a next step, including the impact on the military operations and gathering additional quantitative economic data, through an Extended Regulatory Impact Assessment;
- A full Cost-Benefit Analysis be performed with inclusion of a wide range of stakeholders to confirm the economic feasibility of regulatory options 2 and 3.

## TABLE OF CONTENTS

<b>DOCUMENT CONTROL</b> .....	<b>I</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>II</b>
<b>TABLE OF CONTENTS</b> .....	<b>VI</b>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1 Purpose of the document .....	1
1.2 Requirement for an impact assessment .....	1
1.3 Scope of the document.....	1
1.4 Consultation and expertise .....	1
<b>2. DEFINING THE PROBLEM</b> .....	<b>3</b>
2.1 Safety occurrences .....	3
2.2 Existing rules & regulations .....	4
2.2.1 Mismatch of modern flight profiles with current TAs.....	5
2.3 Current ATM environment.....	5
2.3.1 Multitude of TAs across Europe.....	5
2.3.2 Future operational procedures .....	6
2.4 Problem definition.....	6
<b>3. POLICY OBJECTIVES</b> .....	<b>8</b>
3.1 General objective.....	8
3.2 Specific objectives .....	8
3.3 Operational objectives .....	8
<b>4. POTENTIAL POLICY OPTIONS</b> .....	<b>9</b>
4.1 General remarks .....	9
4.2 Option 1 – No regulatory intervention (status quo).....	9
4.3 Option 2 – Implementing Rule mandating a HETA at 18 000 ft .....	9
4.4 Option 3 – Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft .....	10
<b>5. IMPACT ANALYSIS</b> .....	<b>12</b>
5.1 Option 1 – No regulatory intervention (status quo).....	12
5.1.1 Safety impact .....	12
5.1.2 Impact on ANSPs.....	12
5.1.3 Impact on ATCOs.....	12
5.1.4 Impact on flight crew.....	12
5.1.5 Economic/efficiency impact .....	12
5.1.6 Environmental impact.....	12
5.2 Option 2 – Implementing Rule mandating a HETA at 18 000 ft .....	13
5.2.1 Safety impact .....	13
5.2.2 Impact on ANSPs.....	13
5.2.3 Impact on ATCOs.....	13
5.2.4 Impact on flight crew.....	13
5.2.5 Economic/efficiency impact .....	13



5.2.6	<i>Environmental impact</i> .....	14
5.2.7	<i>Impact on military</i> .....	14
5.3	Option 3 — Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft .....	14
5.3.1	<i>Safety impact</i> .....	14
5.3.2	<i>Impact on ANSPs</i> .....	15
5.3.3	<i>Impact on ATCOs</i> .....	15
5.3.4	<i>Impact on flight crew</i> .....	15
5.3.5	<i>Economic/efficiency impact</i> .....	15
5.3.6	<i>Environmental impact</i> .....	16
5.3.7	<i>Impact on military</i> .....	16
<b>6.</b>	<b>COMPARISON OF OPTIONS</b> .....	<b>17</b>
6.1	Introduction .....	17
6.2	Individual assessment of the options.....	17
6.2.1	<i>Option 1 — No regulatory intervention (status quo)</i> .....	17
6.2.2	<i>Option 2 — Implementing Rule mandating a HETA at 18 000 ft</i> .....	17
6.2.3	<i>Option 3 — Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft</i> .....	18
6.3	Comparative assessment of the options.....	18
6.3.1	<i>Comparison of option 2 against option 1</i> .....	18
6.3.2	<i>Comparison of option 2 against option 3</i> .....	18
6.3.3	<i>Comparison of option 1 against option 3</i> .....	19
<b>7.</b>	<b>A-NPA RESULTS</b> .....	<b>20</b>
7.1	Results questionnaire.....	20
7.2	Generic results A-NPA.....	21
<b>8.</b>	<b>CONCLUSIONS</b> .....	<b>23</b>
<b>9.</b>	<b>RECOMMENDATIONS</b> .....	<b>25</b>
<b>ANNEX A</b> .....		<b>26</b>
DETAILED IMPACT ANALYSIS.....		26
<b>ANNEX B</b> .....		<b>39</b>
MULTI-CRITERIA ANALYSIS.....		39

## **1. INTRODUCTION**

### **1.1 Purpose of the document**

The purpose of this report is to record the results of a Preliminary Impact Assessment (PIA) on the feasibility of a Harmonised European Transition Altitude (HETA).

### **1.2 Requirement for an impact assessment**

Based on interventions made at meetings of the SES Single Sky Committee (SSC) by representatives from Member States, and to overcome ATM problems associated with fragmented Transition Altitudes (TAs) in Europe, an initiative was started to evaluate the possibility of migrating to a HETA of 18,000 ft across the whole of EU airspace. In order to help determine the need for potential regulatory action, the SSC supported the setting up of a small task force to carry out a thorough impact assessment of the concept of a HETA. The impact of such a migration has been specifically assessed in addition to other potential options for the problem of fragmented TAs.

A PIA has been chosen as the most appropriate tool with which to examine the issues using readily available information. The PIA will assist in facilitating informed consultation with the affected Stakeholders on any resultant policy proposals, and it will provide a useful input into the development of supporting material for any associated SES implementing rules that may be proposed as part of the overall policy.

### **1.3 Scope of the document**

Section 2 of this report describes the current situation, identifies the problem and underlying causes, and lists the affected stakeholders.

The policy objectives that need to be achieved to overcome the identified issues and problems are set out in section 3.

The potentially valid options for achieving the policy objectives are described in section 4, and an analysis of the impact of these options using existing available information is set out in section 5.

The results of a comparison of the advantages and disadvantages of the potential options are recorded in section 6.

Finally, conclusions and recommendations for the way forward are set out in sections 7 and 8 respectively.

This PIA is based on the EASA impact assessment template.

### **1.4 Consultation and expertise**

In order to assist with the analysis of the potential policy options, and provide necessary information with which to conduct the PIA, EUROCONTROL has involved internal EUROCONTROL, EASA, and other external expertise from the following specialist areas:

- Regulatory development;
- Impact Assessment;
- HETA Task Force.

With a public consultation under EASA's A-NPA procedure, much wider input was collected. Responses were received from 25 national aviation authorities, airspace users, ANSPs, professional organisations, and private companies. The comments received are summarised and answered in a Comment-Response Document (CRD). This PIA was updated, as appropriate, with the information collected during the consultation period.

## **2. defining the problem**

### **2.1 Safety occurrences**

According to the 'Feasibility Study for Transition Altitude Change in Northern Europe', in 2007 the Norwegian Accident Investigation Board (AIB) published a report (SL Rapport 2007/16) on an incident where the incorrect setting of the altimeter resulted in a loss of separation. In the report, the AIB addressed the following safety recommendation: *'From a flight operational point of view, a standardised transition altitude for an as large as possible geographical area is desired. IFALPA recommends the transition altitude to be set at 10000 feet to make the adjustment of QNH at the same time with other regular routines in cockpit. AIB of Norway recommends CAA-N to consider introduction of a common transition altitude higher than those established today in airspace where Norway is in charge of air traffic services.'*

*Note: In 2010 IFALPA revised their proposed policy as follows: The common transition altitude shall be either 10 000 feet (3 050 metres), or 18 000 feet (5 500 metres).*

During the work on the feasibility study, three of the Nordic States carried out a detailed analysis of safety occurrences in order to assess whether or not altimeter setting procedures had been a contributing factor. In this exercise they found that in the period 2006 to 2008 there were a total of 67 incidents involving incorrect altimeter setting, i.e. relating to failure to use the correct reference, QNH or standard setting.

Furthermore, one other European State did the same detailed analysis and reported that in the years 2007–2009 there had been 1 287 level busts in that State of which 163 were related to altimeter setting errors. In this context it should be noted that the errors recorded were only those involving an altitude error of 300 ft or more, i.e. the numbers of altitude setting errors would be higher if those with less than 300 ft had been recorded.

Similar detailed information was not available from other States, since they have not done any detailed analysis of safety occurrences from an altimeter setting point of view. The Task Force therefore concluded that there is a need to obtain more data on altimeter setting errors in other States, which should be obtained through the A-NPA.

More detailed information about altimeter setting error safety occurrences is presented at Annex A.

Inputs received during the consultation period of the A-NPA on HETA provided the following additional information about safety occurrences related to altimeter setting procedures:

#### Results of the UK Level Bust Working Group

It was reported that in the UK the issue of level busts was studied by the so-called Level Bust Working Group. In the 18 months from July 1998 to December 1999 a total of 68 level busts related to altimeter mis-settings were observed. Out of these, 43 were related to the non-setting of standard pressure and 16 occurrences were linked to the non-setting of

QNH. The remaining 9 occurrences were related to other reasons related to the setting of the altimeter reference. In its final report published in December 2000, it was recommended that 'The Transition Altitude should be raised to a significantly higher value (e.g. 18 000 ft) and ultimately this should be common throughout Europe'.

#### Example Graz Airport

In an additional comment, Graz Airport was mentioned as an example how a low TA can create safety hazards even when following standard departure routes. This example was listed in the document 'A common European Transition Altitude — An ATC Perspective' in chapter 3.3.4. Due to the low TA of 4 000 ft and in conditions of low QNH, it is possible that on the SID 'MILGO One GOLF' an aircraft respecting the conditions of overflying the point 'D18 GRZ' in FL080 is actually operating almost 1 000 ft below the Minimum Sector Altitude for the specific sector.

## **2.2 Existing rules & regulations**

ICAO documentation related to this subject is as follows:

- *Procedures for Air Navigation Services – Aircraft Operations* (PANS-OPS, Doc 8168) Volume I, Part II, Section 1;
- *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444);
- *ATS Planning Manual* (ATSPM, Doc 9426).

The proliferation of TAs within the European airspace is a direct result of the application by States of the aforementioned ICAO provisions related to the establishment of a TA. In this context, it must be recognised that the ICAO provision stating 'the height above the aerodrome of the transition altitude shall be as low as possible but normally not less than 900 m (3,000 ft)' reflects the operational environment as it existed in the 1950s and early 1960s. The ICAO procedures date from 1958, and were based on the principle that a TA should be as high as required for the purpose of terrain clearance but as low as possible to obtain a common reference (i.e. 1013.2 hPa) for separation purposes for aircraft cruising above the TA.

There were, at that time, several reasons for this principle. One of the important reasons was the lack of air navigation services facilities; some areas of the world did not have the ground-based services and facilities to provide current pressure information to en-route traffic. Therefore, to accommodate a worldwide application, the provisions that are still applicable today (i.e. the use of QNH for take-off and landing and a standard setting of 1013.2 hPa (QNE) for en route) were adopted in order to obtain a common reference for providing vertical separation during the en-route phase of flight.

There are also requirements in Regulation (EC) No 550/2004, and Regulation (EC) No 551/2004 in particular, addressing the need to meet user demands and requirements, and to design and manage airspace in accordance with harmonised rules. The development of an Implementing Rule for HETA could significantly contribute to the achievement of these regulatory requirements.

### 2.2.1 Mismatch of modern flight profiles with current TAs

The established ICAO provisions have clearly been overtaken by time. Important changes have happened to the ATC operational environment, such as the following:

- The introduction of high-performance aircraft; performance characteristics of modern aircraft are totally different compared to aircraft operated at the time the present ICAO provisions were developed.
- The use of cruising levels are now well above the cruising levels used in the 1950s and 1960s.
- Introduction of standard instrument departure (SID) and standard instrument arrival (STAR) routes; SIDs and STARs often use altitudes as reference (step and stop levels) although part of the SIDs and STARs might be flown above the TA (i.e. in a 'flight level' environment). Consequently, there is a requirement to change the vertical reference when flying on a SID or a STAR that introduces complexity, which in turn also might induce errors.
- The introduction of often complex noise abatement procedures where references are expressed in altitudes.
- QNH values are now automatically available; in European States there is an extensive network of QNH sources and the values are readily available.
- The fundamentally changed ATC operational environment, without having changed the procedures for the establishment of a TA, results in the requirement to change altimeter settings during the most critical phase of flight when flight deck workload is at its highest. There are a number of examples indicating that this can result in the flight crew omitting to execute the change in altimeter setting, such as:
  - An aircraft climbing to a flight level without changing from QNH to 1013.2 hPa at the TA could result in a loss of vertical separation and, in the worst case, leading to collisions or near-misses;
  - An aircraft descending to an altitude without changing from 1013.2 hPa to QNH at the Transition Level (TL) may not have the required terrain clearance, which, in the worst case, may lead to a controlled flight into terrain (CFIT) accident.

## 2.3 Current ATM environment

### 2.3.1 Multitude of TAs across Europe

In the current ATM environment across Europe, in some cases the TA is lower than obstacles in the area, thus not fulfilling the terrain clearance requirement. Also, a number of States have not coordinated the TA, and the resulting TL, with that of closely spaced adjacent aerodromes, as required by ICAO, resulting in situations where adjacent TMAs may have different TAs.

There is no common methodology for how to determine TAs (i.e. runway-based, airport-based, TMA-based, airspace-based, flight rules-based, etc.). Moreover, the multitude of TAs, some of them not in accordance with the existing ICAO PANS-OPS, results in an operational environment that, from the flight deck's perspective, can lead to confusion that might result in safety critical situations.

The European Action Plan for the prevention of Level Bust (2004) has Recommendation 4.4.2: *Consider establishment of common European transition altitude.* This has, so far, not resulted in any progress in achieving a common European TA.

Other areas such as Australia, North America, Japan, South-East Asia have already established higher harmonised transition altitudes.

### 2.3.2 Future operational procedures

In future, there will be a stronger need for the implementation of high performance and capacity increasing ATM procedures to be able to cope with increasing traffic demand. In many cases, the implementation would be facilitated by the fact that, during these procedures, a change in the altimeter setting will no longer be required because of the higher TA.

## 2.4 Problem definition

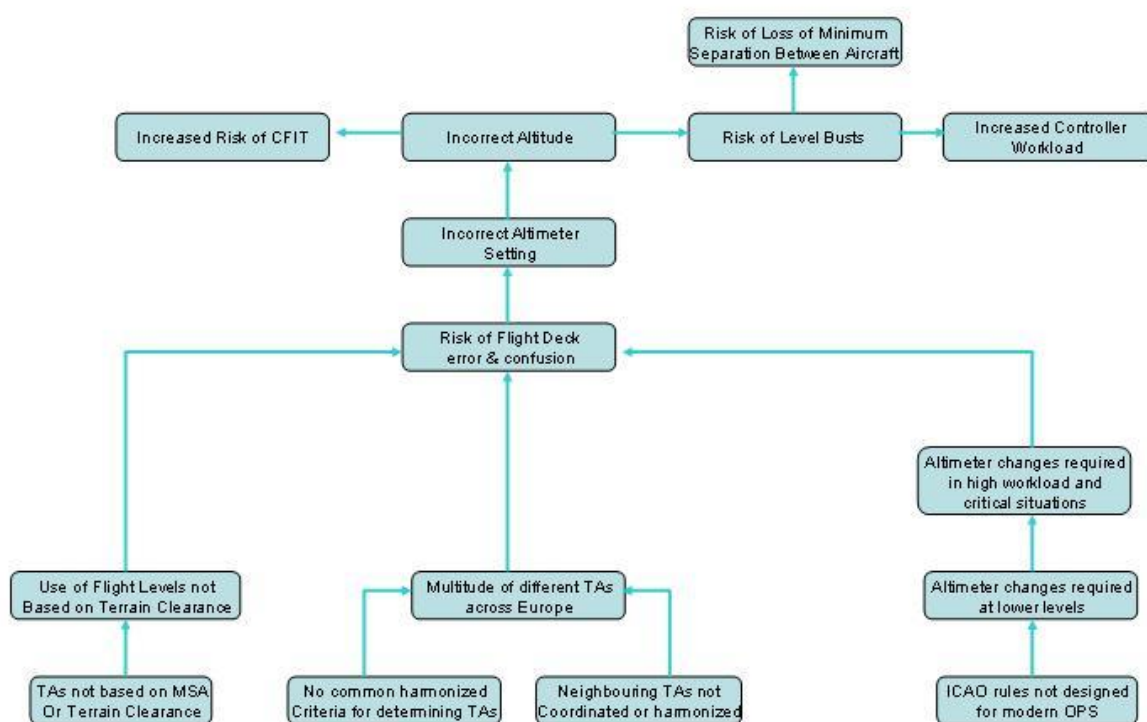


Figure 1: Problem tree

Figure 1 shows a problem tree for the determination of the problems and causes to be addressed in the scope of the investigation of the feasibility of a HETA. The overarching problem that must be addressed is as follows:

***There is potential for confusion and errors on the flight deck, which is caused by the wide variety of TAs used across Europe, the need to change altimeter settings during critical departure and approach phases of flight,***

***and the fact that some TAs do not adequately take into account terrain clearance and minimum safe altitudes. This situation can lead to flights operating at an incorrect altitude and consequently result in an increased risk of loss of separation or CFIT.***

A significant factor contributing to this situation is the fact that ICAO provisions for the determination of TAs were written in the late 1950s, and do not reflect modern flight procedures nor set out clear and harmonised criteria for setting TAs. Another factor is a lack of coordination between neighbouring ANSPs and States when determining TAs.



### **3. policy Objectives**

#### **3.1 General objective**

General objectives are the overall goals of a policy and are expressed in terms of its outcome or ultimate impact. If successful, the intervention should at least induce change in the direction of general objectives. For this policy, the general objective is assessed as being the following:

***GEN01: To improve safety and efficiency levels associated with the use of TAs across European airspace. This objective shall be achieved without compromising the existing safety levels in any other area.***

#### **3.2 Specific objectives**

Specific objectives are the immediate objectives of a policy and are the targets that first need to be reached in order for the general objectives to be achieved. They are expressed in terms of the direct and short-term effects of the policy.

***SPEC01: To reduce the degree of risk associated with incorrect setting of the altimeter reference pressure.***

***SPEC02: To contribute to an increase in the capacity of the European airspace and the efficiency of operational procedures.***

#### **3.3 Operational objectives**

Operational objectives are normally expressed in terms of measurable outputs that the intervention should produce. For this policy, the operational objectives are assessed as being the following:

***OPS01: To minimise the number of incidents of loss of separation between aircraft or risk of CFIT caused by incorrect altimeter settings.***

***OPS02: To minimise the number of occurrences of increased controller/pilot workload arising from incorrect altimeters settings.***

***OPS03: To move required altimeter reference setting procedures conducted by flight crew to a phase of lower workload (i.e. higher altitude).***

***OPS04: To facilitate the implementation of high performance and capacity increasing operational procedures.***

## **4. POTENTIAL Policy Options**

### **4.1 General remarks**

Four potential policy options have been considered in this PIA, including maintaining the current 'status quo' situation and three potential regulatory options. These options are briefly described in the sub-paragraphs below.

During the discussions of the HETA Task Force, one of the four options would have been for an Implementing Rule prescribing common criteria for the determination of the TA. Under this option, no specific limit for the TA to be implemented would be prescribed by regulation. However, this option was ultimately considered to be insufficient because, due to its flexible and more generic nature, it would not have paved the way for a harmonised TA, and/or decreased fragmentation in TAs across Europe, nor did it differ significantly from option 1. Therefore, it was not considered that the effort needed to evaluate the option in full was worthwhile.

For options 2 and 3, the migration phase is of utmost importance. If all of the EU States/FABs do not implement the requirements at the same time, the potential to provide standard operating procedures in cockpits would be reduced. When considering options 2 and 3, it is also necessary to differentiate between the impact in a phased implementation as compared to a 'big bang' approach. In addition, the short-term impacts have to be evaluated as well as the long-term implications.

Every State implementing a TA different from current conditions will have to conduct safety cases which will present all safety issues, both general and on local constraints, and provide the necessary steps and actions to be taken in order to maintain an acceptable level of safety.

In the scope of the A-NPA, one respondent requested that a harmonised TA at 5 000 or 6 000 ft also be evaluated. This option was discussed in the HETA Task Force prior to the launching of the A-NPA. It was concluded that this option should no longer be pursued as it does not answer the airspace users' request for a TA at a higher level.

### **4.2 Option 1 – No regulatory intervention (status quo)**

Option 1 is to take no regulatory intervention on the issue of TAs. European States, under the auspices of the ICAO and EUROCONTROL institutional arrangements, would continue to proceed with, and further evolve, current initiatives without an overarching regulatory requirement being introduced to enforce a particular resolution or approach to the problem.

Nevertheless, this 'status quo' scenario takes into account ongoing activities on TA issues at the level of ICAO and Functional Airspace Blocks (FABs), and is the one against which the impacts of the other policy options can be compared and assessed.

### **4.3 Option 2 – Implementing Rule mandating a HETA at 18 000 ft**

Option 2 is to take regulatory action to implement a HETA of 18 000 ft across European airspace.

It should be noted that, in the scope of the work of the EUROCONTROL HETA Task Force, other altitudes were also evaluated. However, the general agreement amongst the airspace experts was that 18 000 ft was the best candidate. A HETA of 18 000 ft is also in line with IFALPA policy, and feedback from some States shows that the 18 000 ft option is the preferred value from airspace users, which should be strongly emphasised. In addition, the preliminary assessments in UK indicate the demand for a significantly higher TA (18,000 ft) to adapt to the challenges in future TMA operations (in a ten-year perspective).

It is foreseen that this regulatory option includes development of an IR and AMC and GM where appropriate.

#### **4.4 Option 3 – Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft**

Option 3 is to take regulatory action to establish a commonly accepted set of criteria for the determination of a TA in Europe at or above 10 000 ft, and to prescribe a coordinated approach to be taken by neighbouring States/FABs/ANSPs when establishing TAs and associated procedures. Within this option, ANSPs would maintain some flexibility to consider the local environment, but the prescribed minimum altitude ensures the adaptation of the TA to better reflect preferred flight deck operations.

Compared with option 2, this approach would not prescribe a specific value for a HETA, only a minimum value of 10 000 ft with generic requirements, complemented by Acceptable Means of Compliance (AMC) and Guidance Material (GM), where appropriate, for establishing the TA to be used. The regulation to be developed would mandate a harmonised approach and would require States to establish a TA at or above a minimum altitude of 10 000 ft. The AMC/GM would not only pave the way for a harmonised determination of the TA but would also give room for consideration of local constraints. The resulting AMC/GM would not only need to describe the criteria to be applied when determining the TA but also the coordination procedures with adjacent units to be followed during the process.

Potentially, the following details could be contained in the envisaged regulatory material:

1. Binding regulation, through an Implementing Rule, with provisions for each Member State to:
  - a) establish a single TA at or above 10 000 ft;
  - b) coordinate within FABs in which the Member State participates;
  - c) coordinate and establish interfaces with Member States/States providing services in adjacent airspace.
2. Non-binding measures (AMC) to the IR:
  - a) AMC to the Implementing Rule provisions referred to at 1.a) above should, as a minimum, describe the criteria for choosing a certain TA at or above 10 000 ft, Means of Compliance for regional/local QNH measurement and distribution, TL calculation, and consideration of specific geographical and meteorological conditions, etc.;
  - b) AMC to the Implementing Rule provisions referred to at 1.b) above should contain a process description on how to achieve the 1.b)

regulatory requirements with the aim to agree on a common TA across the whole FAB;

- c) AMC to the Implementing Rule provisions referred to at 1.c) above should consist of means for establishing interfaces with adjacent airspace, other than the FAB that the Member State belongs to, with the aim to agree on a common TA.

## **5. Impact Analysis**

The HETA Task Force experts considered the potential impact that each option could have on all stakeholders, and on safety, economic and efficiency aspects, and the environment. The detailed results of the assessments are set out in Annex A.

A summary of the main impacts is provided in the following sub-paragraphs.

### **5.1 Option 1 – No regulatory intervention (status quo)**

#### **5.1.1 Safety impact**

There would be no change to existing safety levels, but the potential risks from non-standardised altimeter setting procedures across European airspace would likely remain. Whilst evolutions in relevant ICAO procedures and initiatives at State/FAB level are already taking place, there would be no assurance about the content and extent of such improvements.

#### **5.1.2 Impact on ANSPs**

There would be no requirement for changes to current planning of resources, budgets, and airspace designs, but any voluntary changes to TAs in States/FABs may cause transition issues between ANSPs and a lack of potential to maximise capacity. Also, there could be a perception that ANSPs were not meeting airspace user requirements.

#### **5.1.3 Impact on ATCOs**

There would be no requirement for any additional training. However, the workload of TMA controllers associated with new capacity enhancing procedures may be positively impacted if TAs are raised to levels above these procedures.

#### **5.1.4 Impact on flight crew**

There would be no requirement for any additional training but the current risks of confusion and errors on the flight deck (caused in particular by the fact that the altimeter reference setting will still have to occur during phases of high cockpit workload) would remain together with the lack of harmonised implementation of TA in Europe.

#### **5.1.5 Economic/efficiency impact**

There would be no loss of existing useable flight levels, and no additional costs would be imposed on stakeholders.

#### **5.1.6 Environmental impact**

The potential to meet environmental performance targets through an improved use of Continuous Descent Operations (CDOs), as well as high performance departure procedures/CCOs, may not be fully realised.

## **5.2 Option 2 – Implementing Rule mandating a HETA at 18 000 ft**

### **5.2.1 Safety impact**

Harmonisation would lead to increased flight deck awareness and reduced workload in critical phases of flight. However, it is anticipated that there would be increases in workload from a greater number of aircraft requiring frequent QNH adjustments, and procedures for steep pressure gradients would need to be developed.

In the responses to the A-NPA consultation, it was indicated that light GA and Air Sports pilots operations, in particular, would take place exclusively on QNH, thereby reducing the risk of an incorrect setting almost to zero.

### **5.2.2 Impact on ANSPs**

Advantages to ANSPs would accrue from a more predictable and simplified ATM operational environment, and option 2 would support capacity enhancing TMA procedures and a potential to improve airspace design and transitions between airspace. ANSPs would also be seen to be acting on airspace user requirements. However, the initial effort and budget required by ANSPs to implement significant changes would be high, including the need for training, safety cases, and changes to systems, airspace design, and publications. Furthermore, in some areas of Europe it may not be possible to adopt a HETA of 18 000 ft without incurring significant cost and/or capacity penalties.

### **5.2.3 Impact on ATCOs**

Although the reduction may be limited by the number of QNH adjustments required, it is anticipated that there would be a reduced workload for TMA controllers; however, there would also potentially be increased workload for area controllers providing ATS to aircraft below 18 000 ft, due to the need to consider QNH settings and QNH areas. Additional training would also be required for controllers not currently handling changes to altimeter reference settings.

### **5.2.4 Impact on flight crew**

There would be advantages for flight crews from a simplified ATM environment across Europe and a more balanced cockpit workload with a possibility for consistent descent gradients. There would also be a reduced risk arising from the need for flight crew to only make smaller adjustments in altimeter settings, and the fact that there would be more opportunities to detect incorrect settings rather than under the current infrequent and potentially large jumps between different altitude reference settings. However, there would also be a need for more QNH adjustments, which may reduce the aforementioned benefits, and there would be a requirement for new training and changes to SOPs in the short term. Also, flights that normally flight plan to cruise between FL180 and FL200 would have to choose between 18000 ft and FL210.

### **5.2.5 Economic/efficiency impact**

Although no quantitative costs and benefits data were readily available for assessment in this PIA, it is identified that there will be costs for implementation. However, it is expected that capacity and efficiency improving TMA procedures would be potentially better supported by option 2, and efficiency levels in TMAs have the potential to increase through the availability of more levels. Nevertheless, depending on the transition plan deployed for option 2, there could be temporary reductions in capacity if the 18 000 ft TA was not implemented concurrently across

Europe. Conversely, a single implementation date could cause additional costs related to system upgrades, as current ANSP plans would be affected.

Sector handling around FL180–200 would also be affected, which may especially impact on current sectors using these levels that are already at capacity limits. There would also be a loss of preferred cruising level for some airspace users.

In the questionnaire distributed in the scope of the A-NPA, the stakeholders were requested to provide information on their costs in case this option would be implemented. Only one stakeholder (a small ANSP) was able to quantify the costs across all affected areas. The costs specified by this ANSP for option 2 amount to EUR 7.1 million. Other cost estimates related to specific aspects only.

In the responses to the A-NPA, it was also strongly recommended that a full CBA be performed before taking a decision on the way forward. Only this would achieve full transparency of the actual costs involved in the implementation of this option.

In another response, it was stated that a harmonised, regulated implementation of a single TA for the European airspace would significantly benefit the implementation of more complex 4D air traffic management vertical performance paths/trajectories of aircraft. A single TA would simplify the computation logic of the aircraft navigation systems needed to support performance-based navigation.

#### 5.2.6 Environmental impact

Through the potential to improve the use of CDOs and CCOs, option 2 could realise potential environmental benefits of less fuel burn, less CO<sub>2</sub> emissions, and less noise. Preliminary studies conducted in one European State indicate these benefits; however, it has not been possible to quantify these impacts for this PIA.

#### 5.2.7 Impact on military

One version of the questionnaire was addressed specifically to military stakeholders. A total of three responses was received. In the questionnaire, military authorities were asked to assess whether or not the introduction of option 2 would have an impact on military flight operations. This was confirmed, but the detailed comments provided suggest that in order to provide details on the impact further studies would be required. Impact on training and systems was also confirmed without further quantification of the required effort.

### 5.3 Option 3 – Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft

#### 5.3.1 Safety impact

Safety advantages would accrue from the fact that local issues and user requirements would be taken into account, and the number of aircraft requiring frequent QNH changes would potentially be less than under option 2. However, there could be slightly less overall safety advantages for reducing the risks of CFIT and level busts than under option 2, because less harmonisation would mean that benefits for flight deck awareness would not be as great.

In the responses to the A-NPA consultation, it was indicated that light GA and Air Sports pilots operations, in particular, would take place exclusively on QNH, thereby reducing the risk of an incorrect setting almost to zero.

### 5.3.2 Impact on ANSPs

Compared to option 2 there would be similar advantages and disadvantages, but option 3 would allow ANSPs more flexibility taking into account local constraints. Option 3 would also still provide more certainty than option 1 for how to determine and coordinate TAs with neighbouring ANSPs. However, there could potentially be a less simplified and predictable ATM environment than under option 2, because a single TA is not prescribed.

### 5.3.3 Impact on ATCOs

There would be similar advantages/disadvantages for controllers compared to option 2. Where a lower TA than 18 000 ft is adopted there will be less aircraft operating on QNH, thereby reducing workload in this respect compared to option 2. Also, transition issues between different TAs in adjacent airspace would potentially still remain in some areas.

### 5.3.4 Impact on flight crew

There would be similar benefits compared to option 2 but these would be reduced as some fragmentation of TAs across Europe may remain.

In the A-NPA responses, it was stated that a TA of 10 000 ft would fit perfectly into cockpit procedures, as passing this altitude is a 'check event' at which the crew performs a number of actions into which the change of the altimeter reference could be integrated.

Another stakeholder stated that for a TA close to the lower limit of 10 000 ft, there is a risk that within a short period of time aircraft performance may have improved such that the same problems as today reoccur.

### 5.3.5 Economic/efficiency impact

No quantitative cost and benefits data were readily available for assessment in this PIA but costs are expected to be slightly less and easier to plan as compared to option 2. Also, as TAs would result from a thorough evaluation by the ANSPs concerned, the TAs may potentially better fit requirements and allow the definition of more efficient procedures in some areas compared to option 2. Unlike option 2, sector handling around FL180–200 would also not necessarily be affected. However, in parts of Europe, if TAs of less than 18 000 ft were selected, the positive impact on efficiency resulting from improved TMA procedures would be smaller than under option 2, and this may also adversely impact the design of efficient flight profiles.

In the questionnaire distributed in the scope of the A-NPA the stakeholders were requested to provide information on their costs in case this option would be implemented. Only one stakeholder (a small ANSP) was able to quantify the costs across all affected areas. The costs specified by this ANSP for option 3 amount to EUR 7.1 million. Other cost estimates related to specific aspects only.

In the responses to the A-NPA it was strongly recommended that a full CBA be performed before taking a decision on the way forward. This would achieve full transparency of the actual costs involved in the implementation of this option.

In another response it was stated that a harmonised, regulated implementation of a single TA for the European airspace would significantly benefit the implementation of more complex 4D air traffic management vertical performance paths/trajectories of aircraft. A single TA would simplify the computation logic of the aircraft navigation systems needed to support performance-based navigation.



### **5.3.6 Environmental impact**

Taking local constraints and procedures into account when defining a TA would give room for improving flight profiles to take account of environmental benefits. However, if a TA is selected at a lower altitude than 18 000 ft, it may prevent the optimisation of flight profiles, thereby limiting the environmental advantage compared to option 2.

### **5.3.7 Impact on military**

One version of the questionnaire was addressed specifically to military stakeholders. A total of three responses was received. In the questionnaire, military authorities were asked to assess whether or not the introduction of option 3 would have an impact on military flight operations. This was confirmed, but the detailed comments provided suggest that in order to provide details on the impact further studies would be required. Impact on training and systems was also confirmed without further quantification of the required effort.

## **6. Comparison of options**

### **6.1 Introduction**

A qualitative comparison of the potentially valid policy options was conducted to weigh the various positive and negative impacts of the proposals. The overall aim of this comparison was to assist in the forming of clear recommendations, and associated rationale, for policy-makers. To achieve this comparison, multi-criteria analysis was chosen as the most appropriate tool.

A detailed description of the design, conduct, and specific results of the multi-criteria analysis used in this PIA is set out in Annex B.

### **6.2 Individual assessment of the options**

The individual assessments in the multi-criteria analysis at Annex B reflect the following views of the HETA Task Force (it should be noted that the scoring was updated after the A-NPA to take into account the results of the consultation).

#### **6.2.1 Option 1 — No regulatory intervention (status quo)**

Maintaining the 'status quo' would be the cheapest of the three studied options because changes from current plans for TAs in States and FABs would not be enforced through regulation. For similar reasons, it would be the easiest choice.

Allowing States and FABs to focus purely on their current, own TA plans would not be consistent with the aims of the SES initiative to harmonise airspace and procedures throughout the EU. Without regulation, it is expected that current plans for FABs across Europe could move TAs towards less fragmentation but this is by no means certain and the overall effect is uncertain.

Current plans for TAs in States and FABs may eventually result in isolated achievement of some aims of the operational policy objectives, and specifically a reduction in flight crew workload in some areas of EU airspace. However, without regulatory intervention this is not certain and benefits may be minor.

Different stakeholder groups are expected to have polarised opinions about maintaining the 'status quo'. A lack of EU intervention on this long-standing issue is not expected to be acceptable to airspace users, but some States and ANSPs are thought not to prefer regulation.

#### **6.2.2 Option 2 — Implementing Rule mandating a HETA at 18 000 ft**

Mandating the adoption of a specific harmonised TA across European airspace could achieve all of the policy objectives and would be wholly in accordance with the aims of the SES initiative. Although it has not been possible to provide tangible evidence at this stage, it is expected that option 2 could provide benefits to safety and capacity.

Enforcing a specific harmonised TA would present considerable implementation challenges, particularly in some States, which would be difficult to overcome. Furthermore, linked to

this aspect, this is thought likely to be a costly option to implement. Option 2 is expected to be the most favourable for airspace users but less favourable to most States and ANSPs.

### 6.2.3 Option 3 — Implementing Rule prescribing common criteria for the determination of the TA at or above 10 000 ft

Option 3, with its embedded flexibility, allowing greater account to be taken of local circumstances, is expected to be a more acceptable option for most States and ANSPs. It would also realise the aims of improved harmonisation and the raising of TAs in Europe, albeit to a slightly lesser degree than option 2.

Similarly, option 3 is expected to be costly and challenging to implement, although to a lesser degree than option 2.

It is considered that all the policy objectives could be met by option 3, but there would be slightly less certainty in this regard when compared to option 2.

## 6.3 Comparative assessment of the options

When comparing the overall relative advantages and disadvantages of the three options, the results of the multi-criteria analysis at Annex B reveal the following issues.

### 6.3.1 Comparison of option 2 against option 1

The overall 'un-weighted' assessment appears to indicate that maintaining the 'status quo' could be more favourable than firm regulatory action mandating a specific TA for the whole of EU airspace. However, The overall results of the 'un-weighted' and 'weighted' assessments for options 1 and 2 are identical and, therefore, could be considered to be too sensitive to be able to draw any firm conclusions. Nevertheless, the preference for option 1 over option 2 is then further confirmed by the 'weighted' analysis, even though However, if the achievement of the policy objectives is considered to be the most important criteria, then option 2 would be the most successful approach in that regard.

When comparing option 2 against option 1 in the short and long term, the results highlight that option 2 would be costly less acceptable for most states and ANSPs and the most challenging to implement in the short term, but that the longer-term benefits of option 2 could outweigh those for option 1. Moreover, option 2 is consistent with the aims of SES, whereas option 1 is unlikely to be so.

On balance, it is considered that the analysis highlights that the costs and disadvantages associated with option 2 might outweigh the benefits compared to maintaining the 'status quo', particularly in the short term. However, if mitigation for costs and local issues could be found for the short term, option 2 could be considered as a long-term goal through suitable transition measures.

### 6.3.2 Comparison of option 2 against option 3

The 'un-weighted' and 'weighted' assessments appear to indicate that option 3 would be no more favourable overall than option 2, but the results are too close to be conclusive. This preference is then more apparent in the 'weighted' analysis. Compared to option 2, the more flexible option 3 could be less costly more acceptable to the majority of stakeholders and easier to implement. Furthermore, option 3 can be considered as almost

as consistent with the aims of the SES policy as option 2 but would be marginally less likely to achieve all of the policy objectives.

On balance, it is considered that the comparative analysis highlights that option 3 could provide a more appropriate, and pragmatic, regulatory solution than option 2 for the problems associated with TAs across Europe, particularly in the short term.

It was stressed in the A-NPA consultation responses that the potential advantages/disadvantages between options 2 and 3 depend on how far below 18 000 ft the TA for option 3 is chosen. It was further stated that the differences can be substantial.

### **6.3.3 Comparison of option 1 against option 3**

The overall 'un-weighted' and 'weighted' assessments between option 1 and option 3 are considered to be inconclusive.

Although option 3 is more consistent with the aims of the SES policy and would achieve the policy objectives, its high relative costs compared to option 1 raise the question of whether the benefit achieved justifies these high costs. Furthermore, option 1 is easier to implement because only local initiatives will be deployed.

On balance, it is considered that the comparative analysis highlights that, with the information currently available, it is not yet possible to confirm whether there is a net benefit from regulatory activity to solve the issues related to the TA in Europe.

## 7. A-NPA results

Through A-NPA 2012-01, EASA collected stakeholder comments on this PIA. Together with the PIA, a questionnaire was distributed aiming at the collection of additional information on the impact of the various options as well as an indication on the costs involved.

### 7.1 Results of the questionnaire

In order to achieve the optimum result, the questionnaire was tailored to the specific needs of various stakeholders, which have been grouped as follows:

- flight crews: 54 responses
- aircraft operators: 10 responses
- air navigation service providers: 10 responses
- military authorities: 3 responses
- national competent authorities (NSAs & CAAs): 6 responses

Out of the 83 responses, 11 were in favour of option 1, 54 of option 2, and 18 of option 3. In general it can be said that the 'airborne side' (i.e. flight crews and aircraft operators) see the urgent need for change with a clear preference for option 2 (4-48-12). The 'ground side' is more evenly divided amongst the three options (7-6-6). The following picture shows the distribution of the support across the various options.

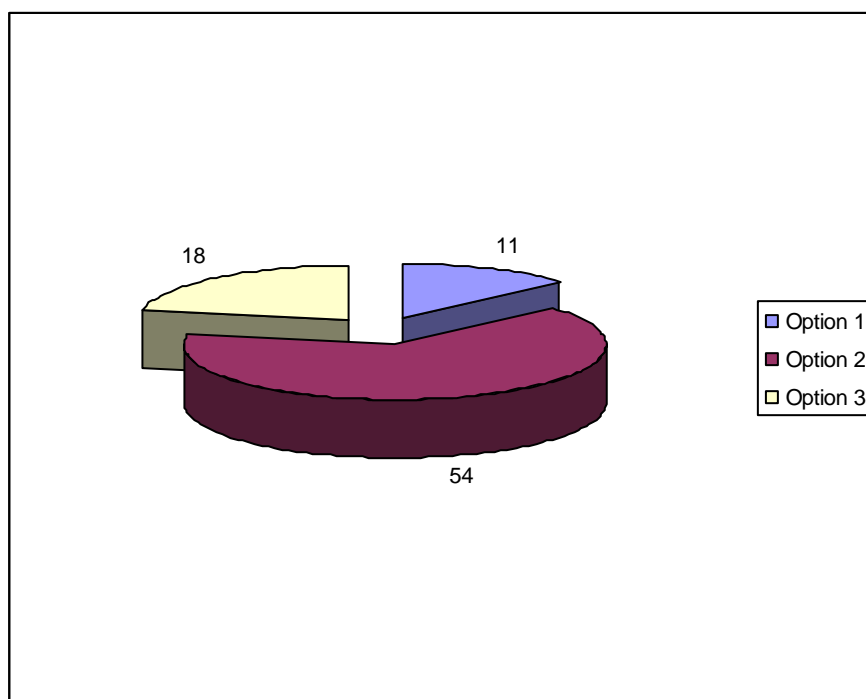


Figure 2: Results of the questionnaire

One of the aims of the questionnaire was to gain an idea about the costs involved in the implementation of options 2 and 3. Only one (small-sized) ANSP could quantify the costs across all areas and came up with EUR 7.1 million of investment. Other cost estimates applied to individual aspects only.

With respect to safety, the 'airborne side' as well as the CAAs/NSAs were convinced that options 2 or 3 would improve safety, whereas the ANSPs were less certain (broadly 50:50 agreed and disagreed).

With options 2 and 3, the 'airborne' side envisaged clear improvements in the operational environment and a step towards harmonisation in Europe. However, ANSPs did not expect an increase in capacity by the implementation of option 2 or 3.

In summary, the 'airborne' side would realise benefits from an implementation of option 2 or 3, whereas the 'ground side' envisages no improvements for the expected substantial costs.

## 7.2 Generic results of the A-NPA

A total of 105 comments from 25 commentators was received during the A-NPA.

One commentator noted that he/she had no comments at the current time.

The remaining 24 commentators supported the three options offered as follows:

Option 1: 6 commentators,

Option 2: 13 commentators,

Option 3: 5 commentators.

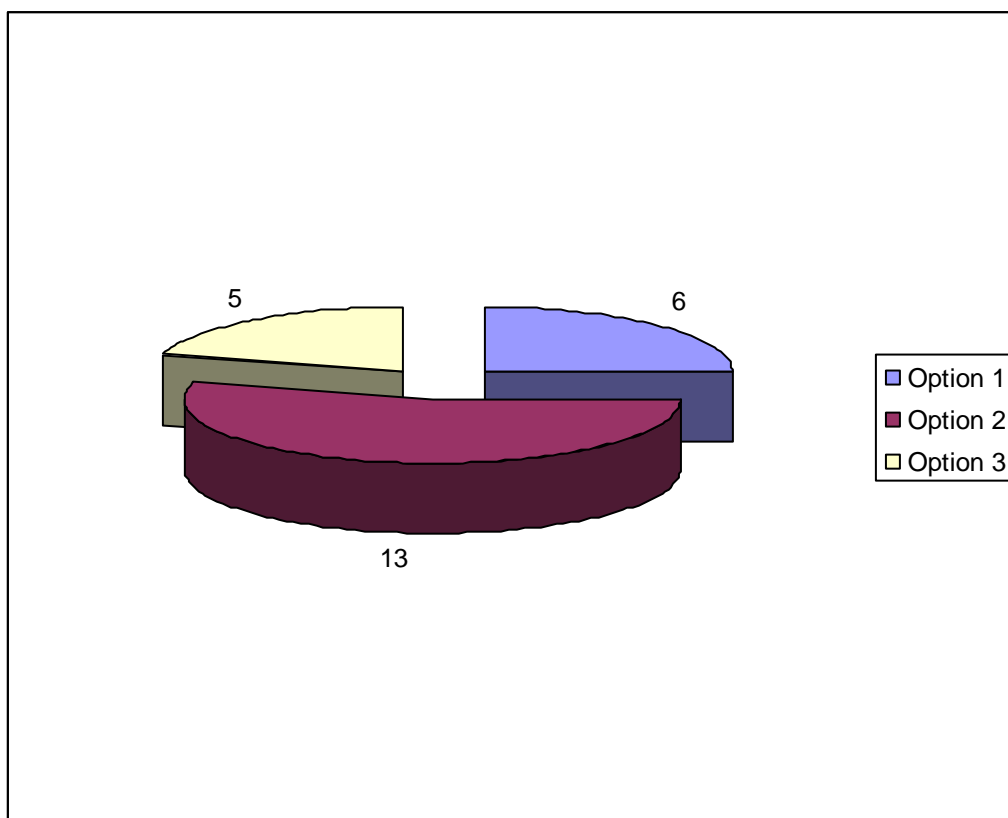


Figure 2: Results of the A-NPA (comments)

Other suggestions expressed by the commentators included the evaluation of other altitudes than the ones proposed (i.e. 5 000 or 6,000 ft) and the need to perform a full cost-benefit analysis.

The results of the A-NPA consultation were used, where appropriate, to update this PIA. The full set of comments and the Agency's responses are available in a separate Comment-Response Document (CRD).

## 8. CONCLUSIONS

As it can be seen from Annexes A and B, the HETA TF has studied various impacts from different angles, highlighting a significant number of advantages and disadvantages of the three potential policy options. Nevertheless, this is a preliminary assessment and, in further steps, issues like the implementation cost and the relationship between a 'big bang' approach for implementation and the established plans of ANSPs need to be further analysed. Without more detailed information on these important issues, this PIA and the comparison of the options evaluated does not yet allow the Task Force to draw a firm conclusion as to whether the problems with TAs in Europe are best solved with or without regulatory intervention.

In addition to option 1 (i.e. no regulatory activity), a comparative assessment of two potential regulatory options has been assessed during a PIA process on the harmonisation of TAs in European airspace. As a result of this, the following conclusions were reached:

- Whilst developing an Implementing Rule to prescribe a HETA of 18 000 ft (option 2) should be the most effective approach, it seems unlikely to achieve consensus across stakeholder groups less favourable than maintaining the 'status quo' (option 1) because it would not be possible to implement this option without significant potential cost and/or capacity impacts in certain areas of Europe. However, this regulatory option is the one most consistent with the overarching objectives of EU policy and SES regulations.
- Developing an Implementing Rule to prescribe common criteria for the determination of TAs at or above 10 000 ft (option 3) (option 3) appears to be more favourable than maintaining the 'status quo' (option 1) and could provide a more pragmatic regulatory option than a single HETA, particularly in the short term. This option would provide States and ANSPs with more flexibility, it could be less costly than implementing a single HETA at 18 000 ft (option 2), and it could be more acceptable to the majority of stakeholders. It and should achieve most of the policy objectives, although it will not ensure the same level of harmonisation as option 2.

Even without a regulation, under the 'status quo' scenario some implementation of higher TAs would take place. However, this would be on a non-harmonised basis and fragmentation would continue to exist. Therefore, airspace user requirements to reduce workload during critical phases of flight and reduce the probability of errors during critical procedures would not be fully met.

Nevertheless, The results of the multi-criteria analysis conducted by the HETA TF during this PIA were very close and, therefore, gaining wider stakeholder views and quantitative data on costs would be useful inconclusive. This, and the divided opinions of stakeholders about options in the responses of the A-NPA consultation, means that gaining wider stakeholder views and quantitative data on costs would be essential before any firm the results of this PIA could be confirmed. Additionally, although the feasibility study for the Nordic States has already considered military aspects, the impact on the military needs to be further investigated.

In summary, based on the weighted analysis (Annex C, paragraph 2.3) where the options were ranked in order: option 3; option 1; option 2, the HETA TF drew the following conclusions:

1) Developing an Implementing Rule to prescribe common criteria for the determination of TAs at or above 10 000 ft (option 3) appears to be more favourable



than maintaining the 'status quo' (option 1) and could provide a more pragmatic regulatory option than a single HETA, particularly in the short term;

2) Although the results of the multi-criteria analysis do not provide big differences between the options, it can be deducted that, because of short term costs and implementation challenges, the development of an Implementing Rule to prescribe a HETA of 18 000 ft (option 2) appears to be less favourable than maintaining the 'status quo' (option 1);

3) Feedback should be requested from a wider range of stakeholders on the three options evaluated and to collect quantitative data to confirm the results of this PIA.

With the exception of economic costs, the comments received on the A-NPA and the responses received to the questionnaires did not contain information that would indicate the invalidity of the results achieved in the PIA.

However, even after the public consultation the available data is still very limited; only one cost estimate spanning the whole range of affected areas was received. Mindful of the significant impact, both on the operational environment as well as the costs involved, the current PIA result does not justify a clear decision in favour of a particular option.

## 9. **RECOMMENDATIONS**

It is recommended that:

- wider views of stakeholders should be sought as a next step, including the impact on military operations and gathering additional quantitative economic data, through an extended Regulatory Impact Assessment;
- a full cost-benefit analysis be performed with inclusion of a wide range of stakeholders to confirm the economic feasibility of regulatory options 2 and 3.

It is recommended that:

• Regulatory action to prescribe common criteria for the determination of TAs at or above 10 000 feet should be the preferred option for harmonisation of TAs in European airspace.

• Wider views of stakeholders, including the impact on military operations, and additional quantitative data should be sought as a next step in order to confirm the findings of this PIA.

**Annex A**

**DETAILED IMPACT ANALYSIS**

Option 3 is expected to deliver the same benefits and disadvantages as option 2 but to a lesser extent. In case of specific advantages or disadvantages compared to one of the other options, this is explicitly stated in the respective table itself.

**A.1 Safety Impact**

*Note: most of the elements hold a safety relevance, only some more specific ones are highlighted below.*

Option 1	Option 2	Option 3
<b>SAFETY ADVANTAGES/BENEFITS</b>		
No change in current safety levels with reference to this issue	A common, harmonised ATM environment would improve the overall safety and a common TA supports a harmonised ATM environment	Compared to option 1 a harmonised environment resulting from a common set of requirements will lead to a lower risk of altimeter mis-settings reducing the risk of loss of separation and CFIT.
	A common TA would improve flight crew awareness of the environment they are operating in, i.e. potentially reduce the number of mis-settings of altimeter thereby potentially reducing the number of level busts	If the TA is set at a lower altitude as compared to option 2, the number of flights affected by the changes of QNH will be lower.
	A higher TA would displace the required action by flight crews to change reference system altimeter setting from immediately after departure to an altitude above the level band where flight deck workload is at its highest	A TA determined within the common set of requirements (rather than one value being prescribed by regulatory action), ensures that it considers all local constraints.
	A common TA would allow for a better integration of the altimeter setting into flight deck procedures for European airspace	Compared to option 1 a minimum TA of 10,000 ft takes into account concerns raised by airspace users.
	Frequent updates by ATS of current QNH to be used (shift between area QNH and/or change from area QNH to local QNH) may reduce the possibility of pilots forgetting to set the correct QNH and/or change from QNE/QNH and vice versa.	

Option 1	Option 2	Option 3
	<p>A higher TA has the potential to reduce the risk of CFIT through addressing the situation where TAs are set to be below minimum safe altitude requiring pilots to set QNE on one altimeter and QNH on the other in order to ensure terrain clearance expressed in vertical distance above minimum safe altitude while aircraft are expected to fly using flight levels.</p> <p>The altimeter reference provided by ATS will ensure that all aircraft operating in the sector/QNH-area below 18,000 ft will be on a safe reference (provided that pilots in descent actually changes from standard) There will be a larger and consequently safer buffer from 18,000 ft and down to discover potential situations where pilots forget to change, than from a low TA where the situation could lead to a potential CFIT</p> <p>A higher TA has the potential to reduce the risk of airspace infringements through having all flights below 18,000 ft on one reference system only.</p> <p>Since it is expected that occasions of wrong altimeter setting between the different reference systems will be reduced, there is a possibility for lower workload</p> <p>A higher TA will eliminate the possible changes of reference (changes between QNH and QNE) in high workload situations as in missed approaches and/or re-clearances for new approaches or level-offs. This becomes even more important in emergency situations.</p> <p>Small altimeter adjustments because of variations in the QNH value are considered as safer than one single change between QNE and QNH for the following reasons:</p> <ul style="list-style-type: none"> <li>• A small adjustment can be fit into the flight deck procedures easier than a big change;</li> <li>• Multiple small adjustments provide numerous opportunities to detect and correct a wrong setting;</li> <li>• If only small adjustments have to be made, the risk for a gross mis-setting is smaller</li> </ul>	

Option 1	Option 2	Option 3
<b>SAFETY DISADVANTAGES/COSTS</b>		
<p>There will continue to exist significant variations in the value of the TA, but also in respect of procedures related to the establishment of TAs and TLs, and it is universally accepted by safety experts that non-standard procedures constitute a safety risk</p>	<p>Increases the number of flights that will be subject to QNH adjustments (i.e. all flight below 18,000 ft including new QNH in a sector and consequent requirement for read back of QNH).</p>	<p>Compared to option 2 and if the TA is defined at a lower altitude, the positive effect on the risk of CFIT incidents will be reduced.</p>
<p>Maintains the operationally unsatisfactory situation of today where the current diversity in TAs is considered by IFALPA to have a negative impact on safety</p>	<p>Procedures for steep pressure gradients need to be developed</p>	<p>Compared to option 2 and if the TA is defined at a lower altitude, the positive effect on reducing the risk of level busts due to pilots forgetting to change the altimeter setting in critical phases of flight will be less because then the number of altimeter settings taking place during specific operational procedures will in many cases be higher than if the TA is set at 18,000 ft.</p>
	<p>Since occasions of wrong QNH setting in airspaces below the higher TA (shift between area QNHs and/or change from area QNH to local QNH) will be increased, there is a possibility for higher workload</p>	<p>Since it is unlikely that a single value for the European TA will be achieved, you will get the benefits of standardisation to a lesser degree</p>
<b>Post A-NPA Update: SAFETY ADVANTAGES/BENEFITS</b>		
	<p>In the responses to the A-NPA consultation it was pointed out that especially for light GA and Air Sports pilots operation would take place on QNH exclusively, reducing the risk of a false setting almost to zero.</p>	<p>In the responses to the A-NPA consultation it was pointed out that especially for light GA and Air Sports pilots operation would take place on QNH exclusively, reducing the risk of a false setting almost to zero.</p>

Option 1	Option 2	Option 3
	Especially light GA and Air Sports pilots would be relieved as they tend to operate close to the TA, crossing the transition altitude many times per flight. While the risk of CFIT for VFR pilots is comparatively small the air space violation risk due to different TA and different altimeter setting requirements (QNH vs Standard) is larger.	Especially light GA and Air Sports pilots would be relieved as they tend to operate close to the TA, crossing the transition altitude many times per flight. While the risk of CFIT for VFR pilots is comparatively small the air space violation risk due to different TA and different altimeter setting requirements (QNH vs Standard) is larger
	It will insure that helicopters may never have to work with Flight Levels.	
<b>Post A-NPA Update: SAFETY DISADVANTAGES/COSTS</b>		
	The increased need for communication between pilots, ATCOs and adjacent units increases the risk of misunderstandings.	The increased need for communication between pilots, ATCOs and adjacent units increases the risk of misunderstandings.

## A.2 Impact on the Air Navigation Service Providers

Option 1	Option 2	Option 3
<b>ADVANTAGES/BENEFITS FOR AIR NAVIGATION SERVICE PROVIDERS</b>		
No need for resources/budget forced to being spent by States/ANSPs on changes related to the value of the TA	Providing more predictable operational environment across areas of responsibility allowing for a coordinated and cooperated change process, giving benefits to involved stakeholders	By not prescribing a single value for the European TA, ANSPs gain some flexibility in determining the TA potentially maximising benefits and allowing consideration of local restrictions
No need to adapt airspace design and working methods to cater for the implementation of a higher TA	A TA at 18,000 ft, in most cases, supports the introduction of capacity improving TMA procedures	Compared to option 1, common criteria for the determination of the TA will ease the coordination between ANSPs and facilitate reaching agreements.
	<p>Considering planned developments (such as the move towards FABs), a move to a common TA at 18,000 ft may introduce possibilities to improve and harmonise current airspace design.</p> <p>No need for establishment of transition arrangements between areas of different TA values.</p> <p>Specific actions such as the establishment of unidirectional routes, the defining of transition airspace, the introduction of increased vertical separation between areas of different TA values does not need to be considered in case of a coordinated move to a common TA</p> <p>Depending on the levels normally used in holding patterns, TA at 18,000 ft may be an advantage because it minimises the mix of flight levels and altitudes in holding</p> <p>SIDs and STARs can be designed to better allow for uninterrupted descents and climbs</p> <p>The move to a harmonised TA of 18,000 ft may facilitate the centralised development of training material thereby reducing effort and costs .</p> <p>A standardised TA will partly contribute to a simplification of the ATM environment.</p>	

Option 1	Option 2	Option 3
<b>DISADVANTAGES/COSTS FOR AIR NAVIGATION SERVICE PROVIDERS</b>		
<p>Since it is anticipated that some States/ANSPs/FABs will implement a higher TA, transfers between areas of high and low TA need to be addressed, and solutions developed, including:</p> <ul style="list-style-type: none"> <li>• transition areas between areas of low and high TA</li> <li>• unilateral routes</li> <li>• increased vertical separation</li> </ul>	<p>The TA is an integral part of airspace design and operational procedures. It therefore follows that a move of the TA up to 18,000 ft will require effort/budget to adapt the existing airspace design and related procedures, resulting in the requirement for ANSPs to address, inter alia, the following:</p> <ul style="list-style-type: none"> <li>• altimeter setting procedures and the definition of QNH areas, including transition between such areas</li> <li>• Transfer of control points and levels may need to be adjusted in cases where flight levels 180 – 200 are used. ANSPs need to:</li> <li>• existing sectorisation, which may involve simulations to assess:</li> <li>• links between airspace design and QNH areas;</li> <li>• impact on any existing delegation of airspace;</li> <li>• impact on special activities airspace and cross border procedures.</li> </ul>	<p>A mechanism has to be put in place and administered to validate the approach of the members state/FAB to decide on the TA against the common criteria.</p>
<p>Could be seen as not acting upon clearly expressed user requirements</p>	<p>Depending on the levels normally used in the holding patterns, 18,000 ft may in some cases introduce a disadvantage because it could increase the instances of a mix of flight levels and altitudes in holding. This applies as well to capacity enhancing TMA procedures such as point merge in case they take place at 18000 ft.</p>	<p>Because of the flexibility in this approach, there is a risk that, due to local considerations the fragmented situation remains although potentially to a lesser degree.</p>
<p>Making the introduction of capacity improving TMA procedures, such as CDAs, High performance SIDs and Point Merge more complex through pilots having to change between reference settings in the middle of those procedures.</p>	<p>There is a requirement to define authorised sources for providing QNH, address legal implications of using QNH sources from other States and define procedures for how to choose a regional QNH from all available sources</p>	<p>Not harmonising at a single TA value the member state/FAB is perceived as not fully acting upon clearly expressed user requirements</p>
<p>Not in line with the recommendation from “The European Action Plan for the prevention of Level Bust”</p>	<p>Requirements for how often QNH should be provided need to be established, the impact of steep pressure gradients and issues related to the delivery of QNH values to crews, communication methods and frequency including contingency procedures needs to be addressed</p>	<p>Not in line with the recommendation from “The European Action Plan for the prevention of Level Bust”</p>
	<p>Training requirements, including human factors issues, will have to be addressed, including the possible need for simulation</p> <p>Safety assessments at national and possibly FAB levels need to be conducted</p>	



Option 1	Option 2	Option 3
	<p>System implications have to be addressed, providing effort/budget to make sure systems are able to provide ATCO with required information. This includes addressing, inter alia:</p> <ul style="list-style-type: none"> <li>• MET inputs (hardware/software changes as required to retrieve selected QNH sources, and for data gathering, processing, presenting and updating)</li> <li>• QNH display system</li> <li>• RDPS changes (new FL/altitude division)</li> <li>• FDPS changes</li> <li>• number of QNH areas</li> <li>• ETFMS links</li> <li>• other tools as identified</li> <li>• barometric warning tool</li> </ul> <p>The time required to address these system changes may vary from ANSP to ANSP, and all ANSPs should assess the time required to enable the system changes and report to the regulator for a decision on the national implementation plan</p> <p>Publications and/or national laws will need to be amended, such as:</p> <ul style="list-style-type: none"> <li>• The change will have an impact on AIS publications including maps and charts, and there will be a need to amend ENR 1.7, ENR 2.1.2, ENR 2.1.3, ENR 3.1, ENR 3.3, AD 2.17 and charts in AD 2.24 (also take into account the Aeronautical information regulation and control (AIRAC) cycle) (The change of TA on some charts may be solved by use of NOTAM until first regular update of the charts)</li> <li>• There is a need to issue aeronautical information circular (AIC) well in advance, to amend letters of agreement (LoAs), to consult chart providers and commercial providers of AIS</li> <li>• ICAO documentation needs to be considered, in particular Doc 7030, and there may be a need to develop amendment proposals to ICAO global provisions.</li> <li>• Operational manuals and LoAs will have to be amended to accommodate and operationally deploy the change at the ops level</li> </ul> <p>The interfaces to the airspace outside the harmonised area will have to be defined.</p> <p>Under special meteorological conditions, such a steep pressure gradients, the application of a harmonised TA and the associated QNH procedures may prove to be not feasible.</p>	

### A.3 Impact on the Air Traffic Controller

Option 1	Option 2	Option 3
<b>ADVANTAGES/BENEFITS FOR AIR TRAFFIC CONTROLLERS</b>		
No need for additional training or amendment to established procedures	No need for intervention by controllers providing separation to aircraft transiting between areas of different reference setting systems, i.e. when one State has a high TA and the neighbouring State have a low TA.	Compared to option 1, in some cases, common criteria resulting in a more harmonised situation across member state boundaries, potentially makes coordination of cross border traffic easier.
	There is no requirement for the development of additional ATC procedures	Compared to option 1, common criteria resulting in a more harmonised situation with regard to the TA, will result in a decrease of level busts because of cockpit errors resulting in lower controller workload
	Within all sectors (and/or QNH-areas) below 18,000 ft all traffic will most probably be on the same reference.	Since the number of aircraft that have to be supplied with the QNH-value (including read-back) potentially is lower reducing controller workload.
	Within the TMA removing consideration of the TA from ATCOs has the potential to significantly reduce workload <ul style="list-style-type: none"> <li>• No loss of Holding levels due to changing Minimum Stack Levels</li> <li>• Minimum TMA overflying levels do not change</li> <li>• A higher TA creates a more stable operating environment.</li> </ul>	
	Descent gradients are consistent because no change of reference setting within TMA airspace (e.g. changing from 1013Hpa to 993Hpa at 6000' putting aircraft approximately 600' off the planned gradient). This helps with CDO, RNAV Arrivals and descent planning from hold to IAF.	
<b>DISADVANTAGES/COSTS FOR</b>		
With the establishment of new capacity increasing and environmentally friendly TMA procedures the complexity for the ATCOs work will potentially increase. This complexity is further increased if within these procedures also the change of the altimeter setting will have to be considered.	Controllers operating in airspaces below 18,000 ft will have to take boundaries of QNH areas (altimeter setting regions) into account, and ensure the accurate provision of area and/or local QNH so that separation is ensured: <ul style="list-style-type: none"> <li>• between traffic inside a QNH area,</li> <li>• between traffic passing from one area to another, and</li> <li>• when transiting from area QNH to local QNH and vice versa</li> </ul>	Compared to option 1, a modification of the TA because of the new guidelines and the resulting modification in the airspace design will potentially result in changing ATC operational procedures

Option 1	Option 2	Option 3
<p>TA in the lower band (i.e. 3,000 ft to 7,000 ft region) will ensure continuation of all the negative aspects, i.e. greater potential for CFIT and level busts, loss of available FLs in TMAs, more workload and unnecessary burden for TMA controllers especially in heavy traffic situations to keep focus on the correct altimeter reference to be used for every single aircraft</p>	<p>Controllers that today do not handle the change between the two reference systems will require training. This change in tasks may reduce capacity in these sectors and increase the workload.</p>	<p>Compared to option 1, if a new TA will be defined but is not harmonised across the state borders existing cross border coordination procedures have to be modified and Air Traffic Controllers have to be trained</p>
	<p>The broadcast of the changed area QNH including the required read-back will have negative impact on the controller workload.</p> <p>Increases the number of flights that will be subject to QNH adjustments (i.e. all flight below 18,000 ft including new QNH in a sector and consequent requirement for read back of QNH). This includes all flights, no matter whether cruising, climbing or descending.</p> <p>May create additional complexity in the vicinity of major TMAs where traffic on area QNH have to be separated from traffic operating on local QNH (in those situation where the area QNH is not the same as the local QNH)</p>	

#### A.4 Impact on the Flight Crew

Option 1	Option 2	Option 3
<b>ADVANTAGES/BENEFITS FOR FLIGHT CREW</b>		
No change will not require any additional training	Standardised TA will contribute to a simplification of the ATM environment.	Compared to option 1 a more harmonised environment potentially reduces the risk of altimeter setting errors and consequently the risk of loss of separation or CFIT.
	A common and higher TA has the potential to provide for a more balanced cockpit workload, through <ul style="list-style-type: none"> <li>• introducing the possibility to develop standardised cockpit operating procedures for the change between reference systems, and</li> <li>• avoiding that the change between different reference systems to take place during workload intense phases of departure and arrival.</li> </ul>	Compared to option 1, since the resulting TA will be definitely located above the minimum value and higher than in today's environment, the setting of the altimeter will be moved to less critical phases of flight reducing the cockpit workload
	Eliminates the operationally unsatisfactory situation of today where the current diversity in TAs is considered by IFALPA to have a negative impact on safety	Compared to option 1, moving the altimeter setting to less critical phases of flight will reduce the risk of mis-setting the altimeter
	The establishment of a standardised 18,000 ft TA will be in line with IFALPA policy, and requirements in EC Regulation 550/2004 and 551/2004 in particular, addressing the need to meet user demands and requirements, and design and manage airspace in accordance with harmonised rules.	Compared to option 1, a harmonised TA environment allows to better harmonise operating procedures.
	Below 18,000 ft all traffic will be on the same reference, ensuring that pilots only have one reference to relate to.	Compared to option 1 criteria resulting in the establishing of a higher TA have the potential to result in more streamlined procedures such as STARs, SIDs, CDOs, CCOs and holdings for which a change in altimeter setting might no longer be required.
	All traffic operating below 18,000 ft will obtain the QNH to be used, and changes thereof, ensuring they operate (provided they change when supposed to) on a safe reference in regard to terrain clearance and separation between aircraft.	Compared to option 1 criteria resulting in establishing more standardised and higher TAs is more in line with IFALPA policy, and requirements in EC Regulation 550/2004 and 551/2004 in particular, addressing the need to meet user demands and requirements, design and manage airspace in accordance with harmonised rules.
	Descent gradients are consistent because no change of reference setting within TMA airspace (e.g. changing from 1013Hpa to 993Hpa at 6000' putting aircraft approximately 600' off the planned gradient). This helps with CDA, RNAV Arrivals and descent planning from hold to IAF.	Compared to option 1, the possibility of multiple en-route altimeter adjustments for all flights operating below a raised TA will provide more update and focus on the correct altimeter reference to be used by pilots, potentially reducing level busts and wrong settings of QNH.

Option 1	Option 2	Option 3
	<p>For the flight crew the change between different altitude reference systems is considered more significant than the adjustment between small variations of the QNH value. These adjustments constitute a smaller risk than the changes.</p> <p>Because altimeter adjustments will happen more frequently than the change from QNE to QNH there are more opportunities to detect and correct a wrong altimeter setting.</p> <p>Frequent small adjustments reduce the risk for gross mis-settings.</p>	<p>Compared to option 1, a larger number of flights or a bigger portion thereof will be performed under QNH settings. The fact that these settings are subject to small adjustments rather than one big change when transiting from QNE to QNH or vice versa is considered by flight crews to be safer?</p>
<b>DISADVANTAGES/COSTS FOR FLIGHT CREW</b>		
<p>There will continue to be SID/STARs with terrain constraints expressed in QNH while the flight is still required to be flying on standard setting (above the TA)</p>	<p>Passing of multiple sectors with different QNH below TL may introduce additional adjustments to altimeter setting after passing TL, minimising the positive effect of not having to change the altimeter in the critical phases of flight</p>	<p>Since no common harmonised TA has been mandated, a fragmented TA environment may continue to exist and procedures may differ in different areas.</p>
<p>Flight crews will continue to be subjected to non-harmonised procedures</p>	<p>Flights that normally flight plan to cruise between FL 180 – 200 will have to choose between 18,000 ft and FL210</p>	<p>Potentially a larger number of flights or a bigger portion thereof may be performed under QNE settings. The advantage of the smaller adjustments of the altimeter setting rather than the single action of the change between QNH and QNE (and vice versa) is lost for those flights</p>
<p>Flight crews will have to execute the change between different reference systems at the time when cockpit workload is at its highest</p>	<p>Training requirements will have to be addressed</p>	<p>Not harmonising at a single value could be seen as not fully acting upon clearly expressed user requirements</p>
<p>Maintains the operationally unsatisfactory situation of today where the current diversity in TAs is considered by IFALPA to have a negative impact on safety</p>	<p>A modification to the TA may have an influence on the SOP because some SOPs are designed to include altimeter information.</p>	
<p>Pilots forgetting to change from QNE to QNH at low altitudes can create critical situations in regard to CFIT.</p>		
<b>Post A-NPA Update: ADVANTAGES/BENEFITS FOR FLIGHT CREW</b>		
		<p>10,000 ft is a “check event” anyway where multiple actions are performed by the flight crew. The altimeter reference setting could be nicely integrated into this procedure.</p>

## A.5 Economic and Efficiency Impact

Option 1	Option 2	Option 3
<b>ECONOMIC AND EFFICIENCY ADVANTAGES/BENEFITS</b>		
No potential loss of FL for Area controllers between 18,000 ft and FL 210.	A TA at 18,000 ft will support the introduction and further development of <b>capacity and efficiency improving TMA procedures</b> , such as <ul style="list-style-type: none"> <li>• CDAs;</li> <li>• High performance SIDs; and</li> <li>• Point Merge.</li> </ul>	Since the TA will be result of a thorough evaluation by the ANSPs concerned (rather than prescribing a single value) for some cases it potentially better fits the requirements and allows the definition of more efficient procedures.
No investments for new related technological, organizational and procedural implementations.	The efficiency in the TMA has the potential to increase through the availability of more levels	In some areas where a loss of levels in the area between FL180 and FL 210 cannot be afforded (like in the alpine region) option 3 allows to set the TA at a different, more convenient level. This will allow to minimise the impact on capacity and efficiency.
<b>ECONOMIC AND EFFICIENCY DISADVANTAGES/COSTS</b>		
Making it more difficult to reach the full potential from the introduction of capacity improving TMA procedures, such as CDAs, High performance SIDs and Point Merge through having the change between reference settings in the middle of those procedures.	During the implementation phase we may experience a situation of a temporary capacity reduction. The extent of this reduction very much depends on whether the implementation will be performed in a “big bang approach” or in a phased approach.	If the TA is selected at a lower altitude than 18,000 ft, the positive impact on efficiency resulting from improved TMA procedures will be smaller.
Loss of a FLs in a busy TMA environment (i.e. with a TA in the 3,000 ft to 7,000 ft region and especially for TMAs with limited upper limits) will potentially create a burden for controllers, and result in an inefficient flow of air traffic.	Different States have different plans as regards system upgrades which will be affected by a decision on one single implementation date and thereby introduce additional cost.	If the TA is selected at a lower altitude it may impact the design of efficient flight profiles limiting the economic advantage.
	<p>The complex flight level allocation scheme will require a review, with possible negative impact on efficiency of operations.</p> <p>The implementation of a European wide TA at 18,000 ft will have a significant impact on systems and resources, especially during the planning and implementation phase.</p> <p>In sectors handling flights in levels around FL180-200 the efficiency may have the potential to decrease which in some cases already may be bottlenecks</p> <p>For certain aircraft operators such a change will result in the loss of their preferred cruising level.</p>	

Option 1	Option 2	Option 3
	In sectors handling flights at levels around FL180-200 the efficiency may have the potential to decrease. This will most severely affect sectors that are now already working at their capacity limit.	
<b>Post A-NPA Update: ECONOMIC AND EFFICIENCY ADVANTAGES/BENEFITS</b>		
	A harmonized, regulated implementation of a single Transition Altitude (TA) for the European airspace would significantly benefit the implementation of more complex 4D air traffic management vertical performance paths/trajectories of aircraft. A single TA would simplify the computation logic of the aircraft navigation systems needed to support performance based navigation.	A harmonized, regulated implementation of a single Transition Altitude (TA) for the European airspace would significantly benefit the implementation of more complex 4D air traffic management vertical performance paths/trajectories of aircraft. A single TA would simplify the computation logic of the aircraft navigation systems needed to support performance based navigation.
<b>Post A-NPA Update: ECONOMIC AND EFFICIENCY DISADVANTAGES/COSTS</b>		
		If a TA close to 10 000 ft is chosen there is a risk that within a short period of time aircraft performance will have increased to such a level that the same problems as now are active.

## A.6 Environmental Impact

Option 1	Option 2	Option 3
<b>ENVIRONMENTAL ADVANTAGES/BENEFITS</b>		
Environmental impact not quantified.	A common TA at 18,000 ft may support meeting environmental performance targets through its potential to improve the use of CDAs, as well as high performance departure procedures. Through ensuring optimal flight profiles, the environmental effects will be less, including less fuel burn, less CO <sup>2</sup> emissions, and less noise.	Taking the local situation and procedures into account when defining the TA will give room for improving the flight profiles resulting in environmentally positive results.
<b>ENVIRONMENTAL DISADVANTAGES/COSTS</b>		
By not introducing a common TA at 18,000 ft the possibility to support meeting environmental performance targets through an improved use of CDAs, as well as high performance departure procedures will be reduced. Therefore the positive environmental effects will be less.	Environmental impact not quantified.	If the TA is selected at a lower altitude it may prevent the optimisation of flight profiles limiting the environmental advantage.

## **ANNEX B**

### **MULTI-CRITERIA ANALYSIS**

Within the EUROCONTROL HETA Task Force, experts agreed on a set of evaluation criteria with which the merits of the individual options can be assessed subjectively. These are described in paragraph B.1 below, and they were specifically chosen to tease out the most important attributes of the options that need to be taken into account.

The initial part of the analysis involved the use of a predefined 'scoring' system set out in a taxonomy to assess the merits of the options against each of the evaluation criteria. This was conducted using the expert judgement of the HETA Task Force members. Within the multi-criteria analysis, there was also a need to reflect the fact that some positive and negative impacts may potentially be of more importance than others. Therefore, a simple comparative 'weighting' system with which to assign relative importance to the individual evaluation criteria was also devised to provide an additional, subsequent 'layer' of analysis. The scoring taxonomies are set out in paragraph B.2.1 below.

The results of the evaluation, set out in paragraphs B.2.2 and B.2.3 below, reflect the overall agreement of the HETA Task Force experts on the basis of currently available information.

It should be noted that all scoring is based on a comparison of an option against the other options, and so it reflects a relative score rather than absolute values.

The updated scores being the result of the evaluation of the A-NPA comments rather than a discussion in the HETA Task Force, the following tables do not, in their entirety, reflect the opinion of the HETA Task Force members.

#### **B.1 Comparative analysis criteria**

Together with the members of the HETA Task Force, evaluation criteria were developed to allow a qualitative comparison of the options in order to come to a ranking.

##### ***B.1.1 Consistency with the aims of the European Union policies and regulations***

With this criterion, an assessment needs to be made of the extent to which the individual options are consistent with the overarching objectives of the European Union policies and regulations, such as harmonisation, capacity, etc.

##### ***B.1.2 Relative costs***

This criterion provides a means to compare the expected costs of implementation of each of the options compared to the others. The result will be an indication of the relative costs of an option and not an indication of the absolute cost to be expected.

The intention of this criterion is to provide an indication of the relative costs of the individual option related to systems implementation etc. (i.e. hardware & software). However, it should be noted that there is no relevant, existing cost-benefit data available for consideration in this PIA. Therefore, in this case, the comparative assessment of costs is a purely qualitative exercise using the expert judgement of the HETA Task Force members.

In the responses to the questionnaire submitted together with the A-NPA consultation package an ANSP estimated the total implementation costs of a harmonised TA at EUR 7.1 million. As this can be considered as a major investment compared to option 1, the values of the scores for relative costs were adapted. It is still considered that option 3 with its flexibility to take local



specificities into account will — on the long run — be slightly more economic than option 3. That's why the two options are still valued at a difference of 0.5 points.

### **B.1.3 Achievement of objectives**

A key measure of the capability of the potential options to overcome the identified problem is the extent to which the options are likely to meet the policy objectives. Therefore, the likely effectiveness of each of the policy options in achieving the specific and operational objectives, as identified in section 3 of this PIA, needs to be considered. In essence, this criterion provides a qualitative assessment of the main benefits of the options.

### **B.1.4 Ease of operational implementation**

In association with the technical means of implementing the potential policy options, suitable operational procedures will be essential for ensuring the success of any solution that is adopted. This will, particularly, be the case at the interface of different technical solutions and systems where a multi-tiered or evolutionary strategy is adopted. Therefore, the ease with which new operational procedures can be introduced will be a key factor for ensuring success, and an appropriate assessment must be made for each of the potential policy options.

The intention of this criterion is to provide an indication of the relative cost of the individual option related to human and procedural aspects (such as training, airspace design, documentation, etc.).

### **B.1.5 Likelihood of stakeholder 'buy-in'**

The eventual adoption of any of the policy options, and the likely success that an option may have in overcoming the identified problem, will be highly dependent on the support and investment that stakeholders, and particularly ANSPs, are willing to provide. Therefore, a key criterion for comparing the impact of the options was considered to be the likelihood of stakeholders 'buying-in' to the proposals. In essence, this criterion could be considered as a measure of the foreseen 'political acceptability' of an option.

### **UK CAA stakeholder consultation**

On 11 July 2012, the UK CAA, Directorate of Airspace Policy, published the results of the first stakeholder consultation on the introduction of a harmonised TA of 18 000 ft in the London and Scottish FIRs. A total of 52 responses were received, resulting in the following views:

Support: 20 responses

Broadly supportive: 10 responses

Unable to support: 7 responses

Oppose: 11 responses

Neutral: 4 responses

The UK CAA will initiate a second round of consultation at the end of 2012 aiming at a more detailed impact assessment including operational, equipment, manpower, and overall cost evaluation.

### **Adjustment to the original HETA TF scores**

The replies to the questionnaires and the responses to the A-NPA appear to show more support for options 2 and 3 compared to option 1. However, it has to be considered that the majority of responses/replies was submitted by 'airborne' stakeholders. At a first glance, 'airborne stakeholders' would benefit most from the

implementation of options 2 and 3 (because the cost burden, at first look, is very small), but the high number of replies from this stakeholder group distorts the overall statistical results. On the other hand, amongst the 'ground-based' stakeholders, no clear preference can be inferred. Therefore, it was decided to adjust the original HETA TF scores in the multi-criteria analysis, as follows, to reflect these consultation results:

Option 1 was re-scored at 2.5, indicating that it would attract more than isolated support, but that support and disagreement would not be evenly balanced.

Option 2 was re-scored at 3. While this option was very popular amongst the 'airborne' stakeholders, it received less support from the 'ground-based' stakeholders. This makes the overall support very balanced.

Option 3 was re-scored at 3, indicating that support and disagreement was evenly balanced. While support from 'airborne' stakeholders was less than for option 2, the inherent flexibility draws some support from the 'ground-based' stakeholder groups.

## **B.2 Comparative analysis**

### ***B.2.1 Evaluation of the options***

Qualitative expert views on the impacts of the various options against the evaluation criteria were captured in a structured and harmonised manner to provide, as far as practicable, consistent and reliable results. In addition, a simple scoring system was used to facilitate an element of quantitative assessment with which to aid the final analysis of the qualitative thinking. To achieve this, each of the proposed options was individually 'scored' against each of the aforementioned evaluation criteria. A supporting taxonomy was designed for this purpose, which facilitates the allocation of scores from 1 to 5. The taxonomy used for the scoring system is shown in table 1 below.

As a first layer of analysis, the HETA Task Force experts used the taxonomy to allocate a score of 1 to 5 for each of the options against each of the evaluation criteria. Scores at half point intervals were permitted where the experts felt that an option lay somewhere between the taxonomy descriptors for the evaluation criteria. This initial layer of analysis was conducted on the assumption that all the evaluation criteria are of equal importance. There was also no 'ranking' element to this first analysis layer, which meant that the same 'score' could be assigned to different options under the same evaluation criteria.

Criteria Score	Consistency with the Aims of the EU Policies and Regulations	Relative Costs	Achievement of Objectives	Ease of Operational Implementation	Likelihood of Stakeholder 'Buy-In'
1	Only isolated and/or minor benefits could be realised with respect to the implementation of the EU policies and Regulations	Very high costs relative to the other options	None of the objectives are likely to be met	Very difficult operational implementation issues to overcome	Likely to attract no support from Stakeholders
2	Useful wider benefits could be realised with respect to the implementation of the EU policies and Regulations	High costs relative to the other options	Unlikely to meet all the objectives	Difficult operational implementation issues to overcome	Likely to attract only isolated support
3	Useful wider benefits will be realised with respect to the implementation of the EU policies and Regulations	Medium costs relative to the other options	Could possibly meet all the objectives	Operational implementation should be broadly straightforward	Likely to attract an even split of those for and against the option
4	Very Useful wider benefits will be realised with respect to the implementation of the EU policies and Regulations	Low costs relative to the other options	Will probably meet all the objectives	Easy operational implementation	Support from the majority of Stakeholders expected
5	Implementation of EU policies and Regulations will be significantly enhanced	Very low costs relative to the other options	Will definitely meet all the objectives	Very easy operational implementation	Full support of all Stakeholders expected

Table 1: Taxonomy Applied for the Qualitative Analysis of the Options Against the Criteria

In order to then further refine the overall comparative analysis of the options, a second layer of analysis was applied to the scores assigned during the first layer. To achieve this, a simple 'weighting' mechanism was applied to the evaluation criteria in order to take account of the fact that some of the criteria could be considered as being more important others. Therefore, the HETA Task Force expert views were also obtained on what 'importance' should be afforded to the individual evaluation criteria. The taxonomy shown in Table 2 below was designed to support this 'weighting' process through the allocation of a simple score from 1 to 5 against each of the evaluation criteria. The allocation of 'weighting' to the evaluation criteria was considered independently from the first layer of evaluation, i.e. the individual scoring of options themselves. As there was no need to 'rank' the criteria in order of importance in this second

analysis layer, the HETA Task Force experts were, in accordance with the taxonomy, free to assign the same 'weighting' score to different criteria where they considered it appropriate.

Weighting Score	Level of Importance of the Criteria
1	Very Low Importance
2	Low Importance
3	Important
4	High Importance
5	Very High Importance

Table 2: Taxonomy Used for the Weighting of the Criteria

The analysis mechanism that was then applied was a simple multiplication of the 'un-weighted' scores assigned to the options during the first layer with the 'weighting' scores assigned to the evaluation criteria.

### B.2.2 Results of the Un-Weighted Multi-Criteria Analysis

For this part of the analysis, it was assumed that all the comparative evaluation criteria were of equal importance and so the weighting mechanism was not applied to the scoring system. The results of the un-weighted multi-criteria analysis are shown in Table 3 below.

Criteria Option	Consistency with the Aims of the EU Policies and Regulations	Relative Costs	Achievement of Objectives	Ease of Operational Implementation	Likelihood of Stakeholder 'Buy-In'	Total Score	Ranking
1	1	5	1.5	4	3.5-2.5	15 14	2 1
2	4	1	4	2	2.5 3	14.5 14	3 1
3	3.5	1.5	3.5	2.5	4 3	16 14	1

Table 3: Un-weighted Multi-criteria Analysis Results

### B.2.3 Results of the Weighted Multi-Criteria Analysis

The un-weighted multi-criteria analysis was then modified by taking each of the un-weighted analysis scores assigned to the options in Table 3 above and multiplying them by the weighting score applied to the criteria. A revised total score for each option was then derived. The results of the weighted multi-criteria analysis are shown in Table 4 below.

The weighting applied by the HETA Task Force experts reflects the perceived need to obtain a high degree of support from Stakeholders in the current economic climate for any potential policy. It also takes account

of the need for solutions to realise significant, long-term and broad benefits in order to provide a maximum return on investment. Therefore, achievement of the policy objectives was assigned very high importance. As some of the solutions could be complex because of the high degree of interaction needed between systems, procedures and personnel, and because some of the options could create potentially complex operational interfaces, operational implementation risks were also felt to be of high importance in any policy decision.

Mindful of the current economic climate faced by Stakeholders, the cost criterion was also set at weighting that reflected the high importance of this issue. However, any further in depth extended impact assessment will need to revisit the costs in more detail.

Although consistency with the wider aims of SES policy in the long run cannot be neglected, it was felt to be of less importance in the case of the TA than the other criteria because there is already a functioning system in place which is working reasonably well. Therefore even if no action would be taken, it can be expected that, in future, the ATM environment will also continue to function at least as well as currently observed.

Criteria Option	Consistency with the Aims of the EU Policies and Regulations	Relative Costs	Achievement of Objectives	Ease of Operational Implementation	Likelihood of Stakeholder 'Buy-In'	Total Score	Ranking
1	3	20	7.5	16	14 10	<del>60.5</del> 56.5	<del>2</del> 1
2	12	4	20	8	10 12	58 56	3 2
3	10.5	6	17.5	10	16 12	64 56	4 2
Weighting Score	3	4	5	4	4		

Table 4: Weighted Multi-criteria Analysis Results

**Appendix B – Attachments**

 [ANSPs Quest re.pdf](#)

Attachment #1 to comment [#94](#)

 [ITA Air Force comments related to HETA implementation.pdf](#)

Attachment #2 to comment [#96](#)