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AUDITOR GENERAL

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Ministry of Defence

Carrier Strike: The 2012 reversion decision

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Carrier Strike: The 2012 reversion decision

Report by the Comptroller and Auditor General

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Amyas Morse
Comptroller and Auditor General
National Audit Office

8 May 2013

This report examines the Ministry of Defence's delivery of Carrier Strike and the decision to revert to the short take-off and vertical landing of the Joint Strike Fighter.

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The National Audit Office study team consisted of:
James Gourlay, Martin Wheatley and Tim Reid, under the direction of Tim Banfield.

This report can be found on the National Audit Office website at www.nao.org.uk/carrier-strike-2013

For further information about the National Audit Office please contact:

National Audit Office
Press Office
157–197 Buckingham Palace Road
Victoria
London
SW1W 9SP

Tel: 020 7798 7400

Enquiries: www.nao.org.uk/contact-us

Website: www.nao.org.uk

Twitter: @NAOorguk

Key facts

2020

planned in-service date of Carrier Strike after both the 2010 and 2012 decisions

£1.2bn

Department's estimate of cost savings, over the next ten years as a result of the 2012 reversion decision

150%

increase in the Department's 'cats and traps' cost estimate, since the 2010 Strategic Defence and Security Review

£0.6 billion Department's estimate of cost savings, over the next 30 years as a result of the 2012 reversion decision. This halves the savings estimated over the first ten years, as the decision increases some costs between years 11 to 30

£74 million Departmental estimate of the write-off of spend as a result of the 2012 reversion decision

55 per cent increase in the Department's estimate to procure two aircraft carriers, between 2005 and 2012

100 per cent increase in the estimated cost of each Joint Strike Fighter aircraft, between 2001 and 2012

3 years delay (from 2020 to 2023) to the Department's planned carrier variant option delivery, arising between the 2010 and 2012 decisions

2 years delay (from 2018 to 2020) to the Department's planned STOVL option delivery, arising between the 2010 and 2012 decisions

2 years between the Department's planned STOVL option delivery (in 2020) and its current plans to deliver the third element of Carrier Strike – Crowsnest, a helicopter-based radar system (in 2022)

Summary

Context

1 Carrier Strike capability comprises the Queen Elizabeth Class aircraft carriers, the Joint Strike Fighter aircraft that operate from them and a helicopter-based radar system (known as ‘Crowsnest’). The Ministry of Defence defines the principal role for Carrier Strike as being to provide an expeditionary offensive air capability to contribute to focused intervention, power projection and peace enforcement operations. Carrier Strike is an integral part of the Ministry of Defence’s (the Department’s) plan to build the force structures – known as Future Force 2020 – to meet the policy in the 2010 Strategic Defence and Security Review.¹

2 The most important factor in planning the delivery of Carrier Strike is the choice of aircraft, as this affects much of the carriers’ design. The Department judges that the Joint Strike Fighter, a US-led collaborative programme, is the only aircraft that can meet its operational needs. When it made the main investment decision on the carriers in 2007, the Department planned to procure the Short Take-Off and Vertical Landing (STOVL) variant of the aircraft, which can take off and land on the aircraft carriers unaided. As part of the 2010 Strategic Defence and Security Review the Department decided to procure the carrier variant of the Joint Strike Fighter. This required the ship to be fitted with launching equipment (catapults), and landing recovery equipment (arrestor gear) from the US.

3 We reported on the Department’s decision to change to the carrier variant of the Joint Strike Fighter in two reports published in 2011² and concluded that:

“The Strategic Defence and Security Review decision introduced significant levels of technical, cost and schedule uncertainty; thinking on the way the carriers will be used in operation is still evolving and there are major risks reconstituting Carrier Strike capability after a decade without it. We note that the Department will not have matured its understanding of the consequences of implementing the Review decision until two years after it was taken. At that point, it will more fully understand whether it has been able to develop delivery plans to enable it to achieve value for money from an investment in Carrier Strike which will significantly exceed £10 billion.”

¹ HM Government, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, October 2010.

² Comptroller and Auditor General reports, *Carrier Strike*, Session 2010–2012, HC 1092, National Audit Office, July 2011 and *Carrier Strike: Supplementary Report*, Session 2010–2012, HC 1657, National Audit Office, November 2011.

4 On 10 May 2012, the Secretary of State for Defence announced³ that the Department was reverting to procuring the STOVL variant of Joint Strike Fighter. This report examines how that decision was taken. It is in three parts:

- How the Department worked to understand the implications of the 2010 decision to procure the carrier variant of the Joint Strike Fighter – the Conversion Development Phase.
- The robustness and completeness of the information given to decision-makers.
- The risks to achieving the benefits anticipated by reverting to the STOVL.

5 The Department is continuing to negotiate with its commercial and international partners the necessary changes to the aircraft and carrier projects to reflect the 2012 reversion decision. Until this process concludes, the overall financial data underpinning the decision remains commercially sensitive. Our analysis in this report therefore focuses on how the Department understood and presented the differences between the carrier variant and STOVL options. Overall costs will be included in future Major Projects Reports.

Key findings

Conversion Development Phase

6 **The October 2010 decision was based on immature data and a number of flawed assumptions, partly because the Department decided not to involve commercial and industrial partners in the process.** The carrier variant option could not be delivered until 2023, three years later than thought; a delay the Chief of Defence Staff judged was unacceptable. The Department also found that, contrary to its expectations in 2010, there would be practical limitations to the warfighting interoperability with allies offered by the carrier variant option (paragraphs 1.4 and 2.10 to 2.14, and Figure 1).

7 **By February 2012, the Department's conversion cost estimate had increased by 150 per cent, from £800 million to about £2 billion.** These estimates were based on the Electromagnetic Aircraft Launch System (EMALS). The most significant cost increases occurred in late 2011 and early 2012, as the US provided updated information. The increases occurred after the Department had selected, in March 2011, the EMALS system over the steam-based system, which it estimated to cost £500 million. This steam-based estimate would probably also have increased, but the Department did not continue to develop it because it judged that EMALS offered a flexible, advanced capability with lower fatigue on aircraft launched; and that the steam option, due to obsolescence and integration issues, was not a viable alternative (paragraphs 1.5 to 1.9 and Figures 2 and 3).

3 Statement made by the Rt. Hon. Philip Hammond to the House of Commons, available at: www.parliament.uk/business/news/2012/may/statment-on-carrier-strike-capability/

8 Deciding the future of the Carrier Strike programme was central to the Department's efforts to balance its ten-year equipment budget. When the Department understood the implications of the 2010 decision, it acted quickly to create a unique, streamlined, approvals structure, with focused attention from senior officials. This was crucial to the pace of decision-making (paragraphs 1.10 and 1.11).

9 The Department expects to write-off approximately £74 million as a result of the reversion decision. This figure does not include the unquantified costs in the Department, the Armed Services and industry from the prolonged period of uncertainty arising from the 2010 decision. Making the reversion decision in May 2012 meant the Department did not spend £123 million to complete the conversion studies or have to make approximately £500 million of long-lead investments on the aircraft and carrier projects (paragraphs 1.12 to 1.14 and Figure 4).

Information for decision-makers

10 In May 2012, the Department gave decision-makers two options: to continue converting to the carrier variant, or revert to the STOVL variant. The Department did not present further options because it had not changed its view on the capability advantages of the Joint Strike Fighter variant options over alternative, cheaper but non-stealth aircraft. Similarly, it still believed that the alternative steam-based catapult and arrestor gear was not a viable option. The Department advised decision-makers to make a swift decision between the two options, to avoid the substantial increase in commitments to the carrier variant option outlined in paragraph 9 (paragraphs 2.1 to 2.2).

11 The Department's understanding of the differences between the two options was more mature than in October 2010, but there were still a number of uncertainties that it made clear to decision-makers. The Conversion Development Phase studies were not complete and the Department had ceased work to further understand the STOVL option. The Department made extensive use of its Cost Analysis and Assurance Service to provide independent challenge and to give confidence in its cost estimates. It is unlikely that, even cumulatively, the scale of any potential errors would have completely eroded the cost difference between the two options (paragraphs 2.4, 2.5 and 2.7 and Figure 5).

12 The Department estimated that over the next ten years the STOVL option would be £1.2 billion cheaper than the carrier variant. This difference halves to £600 million over 30 years. The short-term difference was largely due to the 150 per cent cost increase to install EMALS (rather than steam) on one carrier. Over 30 years the difference reduces because of the higher costs of the STOVL aircraft. The Department judged that the outstanding technical risks of the two variants were equal. This judgement has been borne out by developments since the decision in May 2012 (paragraphs 2.6 to 2.9 and Figures 5 and 6).

13 The Department's statement that it will accept a gap in its Deep and Persistent Offensive Capability (DPOC) is a key factor in the potential long-term cost advantage of the STOVL option. The carrier variant has a greater range and payload and would provide a more effective strike capability and meet the DPOC requirement in a way the STOVL cannot. The Department has stated that it will not seek to reinstate this requirement until it replaces Typhoon in the 2030s (paragraph 2.9).

14 The STOVL option offers some potential advantages but achieving these will depend on future funding and policy decisions. The capability differences between the two options are finely balanced and where the greatest advantage lies is a matter of military judgement, which we do not question. The STOVL option could be available in 2020, three years earlier than the carrier variant. Also, STOVL creates the option to operate Carrier Strike from the second carrier and provide a continuous capability. By contrast, the carrier variant could only operate from the one carrier installed with 'cats and traps'. It could therefore only provide capability 70 per cent of the time, owing to scheduled maintenance periods. Risks to both these potential advantages are set out in Part Three of this report (paragraphs 2.10 to 2.14).

Risks to delivery

15 The Department plans to deliver Carrier Strike by 2020; three years earlier than planned with the carrier variant option. After the reversion decision, on 14 May 2012, the Department announced that it had balanced its Equipment Plan 2012–2022. As part of this announcement, however, the Department delayed investment in the third key element of Carrier Strike – the Crowsnest airborne early warning system – which is now not scheduled to be fully operational until 2022. The Department has also delayed funding decisions on a number of other projects, such as its legacy Solid Support Shipping fleet, which will be required for Carrier Strike as well as the rest of the Royal Navy fleet (paragraphs 3.4 to 3.6).

16 The Department will also have to find money to bring the second carrier into operation. The STOVL option offers the potential advantage of operating Carrier Strike from both carriers. However, the Department currently still plans to build, but not operate, the second carrier. It has deferred identifying funding and making the decision to change this policy until the 2015 Strategic Defence and Security Review (paragraph 3.7).

17 There are risks to the timely delivery and the affordability of the Joint Strike Fighter over which the Department has limited control. The aircraft is being procured through a US-led collaborative programme. The production cost of the aircraft has not yet been finalised. Costs could increase further if other partner nations change the numbers of aircraft they buy, or the timing of their orders. There are technical risks from the concurrency of design and production and the amount of software. These issues are common between the variants. Testing is slipping and early production aircraft are likely to have less capability than planned (paragraphs 3.8 to 3.11 and Figures 8 and 9).

18 The highest risk phases of carrier construction and integration are yet to come. Success will depend on the Department negotiating revisions to the carrier contract and its wider maritime industrial agreements, and better incentivising its commercial partners and controlling subsequent risks and costs. These issues are common between the variants. We expect costs will increase from the £5.46 billion reported in the *Major Projects Report 2012*. The Department has budgeted for this (paragraphs 3.12 and 3.13).

19 The Department will have to actively manage technological risks to the cost-efficient delivery of Carrier Strike in adverse weather conditions. The STOVL variant is unable to land vertically on to a carrier in hot, humid and low pressure weather conditions without having to jettison heavy loads. The Department advised decision-makers of this risk but stated that it is confident that the solution it is developing, called Ship-borne Rolling Vertical Landing, will be ready by 2020 (paragraph 3.10).

20 The Department has improved its governance arrangements but risks remain. There is now a Senior Responsible Owner for Carrier Enabled Power Projection (of which Carrier Strike forms an integral part) with a clearer mandate and budgetary authority. There is also a full-time senior official accountable for Carrier Strike. However, Carrier Strike is a complex programme drawing upon both air and navy forces. Managing the potentially divergent views of both these services will be key to the successful delivery of the Carrier Strike capability (paragraphs 3.14 to 3.15).

Conclusion on value for money

21 When the Department realised the extent to which the 2010 decision had been underpinned by immature information and false assumptions it acted quickly to provide decision-makers with significantly improved information.

22 The single most important factor driving the timing of the 2012 reversion decision was the need to balance the ten-year defence equipment budget at the same time as the timely delivery of associated military capabilities.

23 In the longer term, to achieve value for money the Department must introduce a degree of consistency not previously apparent on the programme to work within the financial and capability assumptions which underpinned the reversion decision.

24 Key to realising value from its investment will be bringing the second carrier into operation and the delivery of Carrier Strike capability by 2020. However, successful and timely delivery of the capability will require the Department to manage significant affordability and technical challenges. There are cost, schedule and technical risks across the Joint Strike Fighter programme over which the Department has limited control. The highest risk phases of carrier construction and integration are yet to come and the Department must successfully conclude complicated negotiations with commercial partners before it can be confident it will deliver value for money on the carriers programme overall.