Department
for Business
Innovation & Skills

TRIENNIAL REVIEW OF THE UK ATOMIC ENERGY AUTHORITY

SEPTEMBER 2015

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1. Summary of the Triennial Review of the UK Atomic Energy Authority

Introduction

1. The UK Atomic Energy Authority (the Authority) is being reviewed as part of the Cabinet Office's Triennial Review Programme. The Cabinet Office has identified two principal aims for Triennial Reviews:

   - Stage 1: to provide robust challenge to the continuing need for individual NDPBs – both their functions and their form; and

   - Stage 2: where it is agreed that a particular body should remain as an NDPB, to review the control and governance arrangements in place to ensure that the public body is complying with recognised principles of good corporate governance.

Scope and purpose of Triennial Reviews

2. All reviews are to be conducted according to the following principles:

   - *Proportionate*: not overly bureaucratic; appropriate for the size and nature of the NDPB.
   - *Timely*: completed quickly to minimise disruption and reduce uncertainty.
   - *Challenging*: robust and rigorous, evidencing the continuing need for functions and examining and evaluating a wide range of delivery options.
   - *Inclusive*: open and inclusive. Individual NDPBs must be engaged, key users and stakeholders should have the opportunity to contribute. Parliament should be informed about the commencement and conclusions.
   - *Transparent*: all reviews should be announced and reports should be published.
   - *Value for Money*: conducted to ensure value for money for the taxpayer.

3. The programme of departmental Triennial Reviews is agreed on a rolling basis with Cabinet Office. BIS agreed to carry out a review of the Authority to commence during the first year of the second programme (2014-15).

4. The BIS Minister for Universities and Science, Greg Clark, announced the Triennial Review of the UK Atomic Energy Authority in a Written Ministerial Statement on 22 July 2014[1].

5. The review team was drawn from a range of BIS Directorates to ensure a measure of objectivity, and consisted of:

[1] http://www.publications.parliament.uk/pa/cm201415/cmhansrd/cm140722/wmstext/140722m0001.htm

- Hiroko Plant, (Lead Reviewer), Analysis Directorate
- Amanda Davies, Performance and Risk Manager, Finance
- Erica Butler, Better Regulation Delivery Office
- Lynsey Brooks, Better Regulation Delivery Office
- Melanie Johnston, Environmental Regulations
- David Mitchell (Labour Markets) worked on the review for part of the time
- Richlove Mensah (Analysis Directorate) provided economic support.

Conclusions and Recommendations

6. We set out here the overall conclusions and recommendations from both stages of the review.

- The functions of the Authority are necessary and the Authority meets the Cabinet Office test that this a technical function which needs external expertise to deliver.

- Further, the examples of both Wind Power and Fission demonstrate that Governments that invest early in the development of new technologies have an economic advantage in the area in the future. By continuing to support research into Fusion power in the UK, the government is ensuring it will have a key part of this market in the future.

- In the medium term, the Triennial Review team considers that there are potential benefits from a closer alignment or merger with another relevant body. There are two possible candidates: the National Nuclear Laboratory (NNL), which could create a larger national laboratory with a higher international profile, and with expertise in both fission and fusion technology; or the Science and Technology Facilities Council (STFC), which would offer clear synergies around the management of the Harwell and Culham sites and addressing some of the engineering challenges inherent in the development of nuclear energy over the next two decades. It (or any merged entity) should also consider the tactical advantages of forming a Government Company (GovCo) in whole or in part (though it should be noted that NNL is already a GovCo). Government, the Authority, and possible merger partners should commence work now to determine what the best option would be by end 2016, with a view to implementation from 2018.

- Although a merger would be possible ahead of the end of the existing JET contract, the funding and governance arrangements currently in place for JET will make a merger ahead of its closure more difficult. However, as it is uncertain when the JET contract will end, the Authority and potential partners should begin now to assess the viability of such a merger, including assessing the feasibility of a merger irrespective of whether the JET contract has ended. Until this work is complete, the Authority should continue to operate as an NDPB.

- The Authority's subsidiary functions of ensuring the maximum benefit to the UK from ITER and other international collaborations and developing scientists and engineers with skills suited to nuclear research also meet the Cabinet Office test

that this a technical function which needs external expertise to deliver. We recommend that the Authority continue to deliver them under its existing model until the options of a merger have been fully considered.

- In line with the requirements for the Government's spending review, announced in July 2015, the Authority should work with BIS, HMT and the Government Property Unit to determine options for the future of its property portfolio at Harwell and the Culham Science Centre. We recommend that the Authority should focus its property strategy towards its goals of developing fusion and fission science and driving innovation. The review notes the authority's plans to manage its holdings to encourage further development of the Culham/Harwell/Oxford area as a centre for innovation and growth. We recommend that the Authority, working with BIS, HMT and the Government Property Unit, should go further to determine whether all the land and property currently owned is required for UKAEA or wider UK Science purposes. This investigation should form part of the broader review of science estates started within Government and should investigate all alternative options for the property holdings, including building on existing work with the private sector or selling to the private sector. Regular 6-monthly reports will be shared with the Government Property Unit on progress.

- The skills that are being developed by the Authority's apprenticeship programme have a clear benefit to the UK economy and the UK's aim to expand fission and fusion in the future. The Authority should therefore continue to develop and expand its apprenticeship programme with a view to creating a much larger pool of highly-skilled young people in the Oxfordshire area.

- Phase 2 of this Review should proceed, and in addition to the standard remit of Triennial Reviews should focus on two key areas:

    - With respect to governance, we will focus on the strategic direction of nuclear science in the UK, and on opportunities to create more streamlined governance around this.

    - With respect to efficiency, we will focus on opportunities to streamline the Authority's internal processes, where some stakeholders perceive opportunities to improve staff retention, morale, and interactions with the local community and tenants at the Authority's two sites.

Stage 1 Recommendations

Recommendation 1: We recommend that the Government, the Authority, and possible partners investigate in more detail the possibility of a much closer alignment or merger with either the NNL or the STFC. This would most likely be alongside the major change entailed by the end of the existing JET contract, though the Authority, BIS and possible partners should also consider the possibility of a merger from 2018 irrespective of whether the JET contract has ended. The NNL could create a larger national laboratory with a higher international profile, and with expertise in both fission and fusion technology which would provide a good platform on which to build the UK's future

exploitation of fusion technology. This option also offers the possibility of a merger with a Government Company (GovCo) which may provide some support in achieving process efficiencies. The STFC would offer clear synergies around the management of the Harwell and Culham sites and addressing some of the engineering challenges inherent in the development of nuclear energy over the next two decades. It would also offer opportunities to streamline and improve links to innovative small businesses and to exploit technologies developed by the Authority. Government, the Authority and possible partners should commence work now to determine the best option with a view to assessing the options by end 2016 and implementation from 2018.

Recommendation 2: We recommend that until work has been carried out to assess the viability of a merger with either the NNL or the STFC, the Authority continue to operate as an NDPB. The Authority should be considered to have met the Review's test criteria. In particular, we find that its key function of the delivery of fusion research in the UK is needed and should be carried out by Government, and that it is a technical function which requires external expertise to deliver. The Authority was also deemed to meet the Cabinet Office test of political impartiality, though this is less relevant to the Authority than the requirement for technical expertise. The Authority's subsidiary functions of ensuring the maximum benefit to the UK from ITER and other international collaborations and of developing scientists and engineers with skills suited to nuclear research also meet these criteria and we recommend that the Authority continue to deliver them under its existing model until the work under Recommendation 1 has been carried out.

Recommendation 3: In line with the requirements for the Government's spending review, announced in July 2015, the Authority should work with BIS, HMT and the Government Property Unit to determine options for the future of its property portfolio at Harwell and the Culham Science Centre. We recommend that the Authority should focus its property strategy towards its goals of developing fusion and fission science and driving innovation. The review notes the authority's plans to manage its holdings to encourage further development of the Culham/Harwell/Oxford area as a centre for innovation and growth. We recommend that the Authority, working with BIS, HMT and the Government Property Unit, should go further to determine whether all the land and property currently owned is required for UKAEA or wider UK Science purposes. This investigation should form part of the broader review of science estates started within Government and should investigate all alternative options for the property holdings, including building on existing work with the private sector or selling to the private sector. Regular 6-monthly reports will be shared with the Government Property Unit on progress.

Stage 2 recommendations

Recommendation 1: The Authority and BIS should consider the need to hold regular meetings between BIS Ministers and the Authority to ensure BIS Ministers are sufficiently well informed about the Authority's activities.

Recommendation 2: The Authority should look to address the diversity of its Board and it should create a Board Diversity Policy to address this issue.

Recommendation 3: The Authority, in its revised framework document, should set out how individual board member's performances will be appraised.

Recommendation 4: The Authority should strengthen its Project Management and Project budgetary controls, implement the findings of the planned external review of the MAST Upgrade project and conduct an internal audit of its Project Management processes.

Recommendation 5: BIS should work with the Authority to establish how other establishments which receive funding in Euros but are billed in Sterling handle this variation and the associated risk, and explore whether it is possible to manage the risk collectively across Whitehall – perhaps via an arrangement with HMT.

Recommendation 6: The Authority should look to increase the level of openness and transparency of Board meetings by holding some board meetings openly, with commercial and personal sensitive discussion items remaining closed. The Authority should consider how this can be done with minimal bureaucracy as part of its planned Board review.

Recommendation 7: The Authority should review its procedures for ensuring board and staff compliance with rules on political activity and acceptance of appointments or employment after resignation or retirement, and should ensure that appropriate procedures are put in place

Recommendation 8: The Authority should accelerate the development of its Assurance strategy – including consideration of resourcing - and KPIs for process improvement, and should continue work on risk-based approaches as well as consistency of process, building on its previous good work.

Recommendation 9: The Authority should further develop its environmental impact and energy efficiency strategy to enable it to assess the VFM of more major projects with longer payback periods and to prioritise these effectively, subject to available funding.

Recommendation 10: When the EPSRC has published their fusion strategy the Authority should update their existing strategy, linking it clearly to the EPSRC's.

What is the UK Atomic Energy Authority?

7. This chapter provides background on the UK Atomic Energy Authority (the Authority) and describes its functions and governance.

Main Areas of Responsibility
• Delivering sustainable fusion energy. Operation of JET and MAST tokamaks • Ensuring the maximum benefit to the UK from the ITER and other related advanced energy and technology opportunities • Training scientists and engineers at the frontier of fusion research • Managing the Authority's property portfolio (the Culham Science Centre and Harwell Campus) • Managing the Shareholder Programme Agreement, which funds the Authority's legacy and governance work
Budget
In 2014/15 the Authority budget is £104m, of which around half is provided by the European Commission for the operation of JET and fusion research; an EPSRC grant provides one third for the UK fusion programme and UK contribution to JET; BIS directly funds the legacy costs; and the remainder is provided by business development and property income. The Authority Pension Schemes are funded through a separate Parliamentary Vote.
Staff Numbers
The Authority employs approximately 680 staff and 470 Agency Supplied Workers in specialist areas. Of these, approximately 500 are employed by the JET programme, which also hosts around 350 visiting European scientists each year. The UK-led MAST fusion programme employs approximately 150 people. Approximately 20% of staff are female, but the Authority is working towards Athena Swan recognition and to improve this ratio.
Property
The Authority owns the freehold of the Culham Science Centre and the majority of the Harwell Campus in Oxfordshire

Background

8. Harnessing the power of fusion energy is a major global challenge, but it remains one of the most promising options for generating large amounts of carbon-free energy in the future. The demonstration of fusion power in JET has showed that fusion works, and that we have been able to overcome the key physics challenges. The central issue is therefore to overcome the engineering challenges of making it work reliably and economically on the scale of a power station.

9. The fusion process involves the fusing of several atoms such as deuterium (heavy hydrogen) and tritium (super heavy hydrogen) at very high temperatures (>100 million ºC) to produce energy.

10. There are still great challenges to overcome before fusion becomes a viable source of energy. The science and engineering research challenges ahead to realise fusion as a commercial energy source are major and the timescales are long – of the order of decades.

11. In 2009, Research Councils UK (RCUK) outlined a '20 year vision for the UK contribution to fusion as an energy source'. This set out the rationale and vision for the UK programme of fusion energy. It found that the potential of fusion energy to contribute as a major component of the future global energy system is sufficiently large that it should be pursued in the UK.

12. Fusion research is an area of international excellence in the UK, both in terms of research (where the Authority has a very strong international reputation) and skills (which are transferrable to other areas where the UK's industrial base has strong demand, such as fusion, electrical engineering and design engineering). The RCUK argued strongly that we should continue to invest in fusion for the long term, even when difficult financial choices are being made.

13. This was strongly echoed by other stakeholders in our review, who also argued that the spin-off benefits of fusion research – in both pure science areas, such as astronomy, and applied science/engineering areas including materials science and remote handling - largely offset its risks.

14. RCUK also found that the UK should continue to contribute to world-class research and international leadership in nuclear fusion, particularly developing the technology pathway to fusion energy. In addition, the UK should maximise opportunities for global collaboration and develop a common programme in fusion materials, engineering and technology development.

15. The international pathway to fusion as an energy source is centred around the 'Fast Track to Fusion' which has been signed up to by many countries worldwide. The Culham Centre for Fusion Energy (CCFE) was instrumental in getting this approved by The European Atomic Energy Community (EURATOM). The Fast Track sets out well-defined steps towards a demonstration reactor (referred to as DEMO) which is expected to come online around 2040, with the first working commercial reactor expected around 2050.

16. The focus of fusion activity worldwide will shift towards the end of the decade from the UK-operated Joint European Torus (JET), currently the largest magnetic fusion device in the world which is based at CCFE, to the International Thermonuclear Experimental Reactor (ITER) facility, an international tokamak reactor which will be the first device to release reactor-relevant fusion power (~500MW for hundreds of seconds). ITER is being built in Cadarache, France by the ITER partners Europe, USA, Japan, Russia, China, Korea and India. ITER is the culmination of many decades endeavour to realise controlled nuclear fusion on the basis of magnetic confinement and represents the crucial test of its scientific and conceptual basis. ITER is currently due to start operation in the 2020s, but has been subject to some delays and is still not completely on track. While ITER is under development, JET acts as a crucial test bed for many of its elements.

17. Independently, some Fast Track to Fusion partners – notably China – have begun to develop tokamak reactors. Because of its international reputation and strong international links, the Authority is well-placed to engage with these projects as necessary.

18. Towards the end of the 20-year horizon, attention will be turning towards the demonstration reactor facility DEMO, but preparatory work will need to start well before this.

19. The Authority has a critical role to play in the international pathway to fusion, managing the UK Fusion programme (part of the UK Research Councils Energy Programme), with the aim of delivering sustainable energy by the end of the century. It also offers a unique skillset – stakeholders were unanimous in their view that it is extremely unusual in its combination of strong scientific and engineering expertise with large-scale project management competence, and that this places the UK in a very strong position with respect to the various international collaborations.

The functions of the Authority

20. The Authority has as its principal mission ‘to position the UK as a leader in a future, sustainable energy economy by advancing fusion science and technology and related technologies to the point of commercialisation’.

21. In addition to its main mission, the Authority manages a campus development portfolio at the Culham and Harwell sites and a number of other responsibilities that arise from historical civil nuclear programmes.

22. The Authority was established under the Atomic Energy Act 1954 with responsibility for the UK’s entire nuclear programme. The Authority’s functions, as set out in the 1954 Act, are to produce, use and dispose of atomic energy and carry out research into any matters connected therewith; to manufacture, buy, store and transport any articles which are required for or in connection with the production or use of atomic energy or such research; to manufacture, buy, treat, store, transport and dispose of any radioactive substances; to make arrangements with universities and other institutions for the conduct of research into matters connected with atomic energy or radioactive substances; and to distribute information relating to and educate and train persons in matters connected with atomic energy or radioactive substances.

23. The Atomic Energy Authority Act 1971 split the organisation into three separate bodies, with the Authority retaining responsibility for research only. Further Acts resulted in a continued narrowing of scope and activity. The UKAEA's present form is established by the Energy Act 2004, which provides that the Authority has power for the purposes of carrying out its functions to do all such things as appear to them to be likely to facilitate the exercise or performance of their powers and duties, or to be incidental to doing so.

24. The Authority's main functions, as defined by the Authority are:

- Delivering sustainable fusion energy
- Ensuring the maximum benefit to the UK from ITER and other related advanced energy and technology opportunities
- Training scientists and engineers at the frontier of fusion research
- Managing the Authority's property portfolio (the Culham Science Centre and Harwell Campus)
- Managing the Shareholder Programme Agreement (which funds the Authority's legacy and governance work) and the Authority Pension Schemes.

25. All the functions of the Authority contribute to the Authority's first and primary function of delivering sustainable fusion energy.

Delivery of sustainable Fusion Energy

26. The Authority's work on delivering fusion energy is carried out at the Culham Centre for Fusion Energy (CCFE), which has a strong international reputation both in fusion research and in other technologies which are applicable to fission. Its work contributes to the European Roadmap to the realisation of Fusion Energy[2], which outlines a programme to deliver the first fusion electricity in the 2040s.

27. CCFE is home to the UK's flagship fusion device, the Mega Amp Spherical Tokamak (MAST), an innovative compact device (designed at Culham) that promises to reach fusion conditions at reduced scale and cost. A programme of upgrades to MAST is currently underway. Once complete, MAST will provide much hotter, better-controlled, longer pulse fusion plasmas.

28. CCFE also hosts JET on behalf of the European Union. JET is the only device currently capable of generating significant fusion reactions in the world (in 1997 JET produced 16MW of fusion power from a total input of 24MW). It is operated under a new JET Operation Contract for the European Commission, funded by EURATOM. The contract, which began in January 2014, is for five years until the end of 2018. The current EU Fusion Roadmap assumes JET operation until the end of 2018 and the contract foresees that the facility is closed and handed over to Nuclear Decommissioning Authority (NDA) for decommissioning.

[2] http://www.efda.org/2013/01/bringing-fusion-electricity-to-the-grid/

29. Both the MAST and JET programmes are highly focused on supporting the development of ITER, the international collaboration between Europe, China, India, Japan, South Korea, Russia and the United States to develop an international tokamak reactor.

30. CCFE has a 10-year plan that shows how the UK fusion programme will help deliver the key elements of the EU fusion roadmap through:

- The demonstration of fusion conditions on JET and improved understanding and alternative scenarios on MAST;
- The demonstration of self-sustained fusion burn to support the international device ITER, which will commence operation in France in the 2020s;
- The first fusion electricity producing demonstration plant, commonly known as DEMO, which is proposed to follow on from the ITER project. (Construction to begin ~2030, operation to begin ~2040, first electricity generation by ~2050). CCFE is aiming to play a key part in this design activity.

31. Experiments being carried out on JET, and the expertise that is being developed, are therefore critical to the development of ITER. JET and MAST, once upgraded, will allow UK scientists to make further contributions to the physics of ITER and to the development of the demonstration power plant (DEMO). The JET facility is likely to be needed until ITER is sufficiently advanced that the operational and other expertise based at JET is no longer required to assure the success of the ITER Project. Operation beyond the end of its current contract will depend on acceptance of a case for further support of ITER, or on engagement with other international projects

32. CCFE also conducts research in some advanced fission related areas, where the skills and expertise developed by fusion research are also applicable to fission. A new Materials Research Facility (MRF) at Culham is now under construction, which will expand the work already being carried out on materials research, for fusion and fission applications.

Ensuring maximum benefit to the UK from ITER and other related advanced energy technology opportunities

33. Until JET is decommissioned, the Authority's work and income streams are very largely focused around the operation of JET. As it develops its plans for a post-JET future, it intends to build on the fusion research base, develop into other related areas such as remote handling, maintain and develop the skills of its employees and broaden its funding streams (by securing fully funded ITER work and by increasing income from non-fusion funding sources including the RACE remote handling facility).

34. The aim of this business development is to secure the long-term viability of the Culham Science Centre as a home for fusion research, to contribute to the overall growth of the UK research base into nuclear technology, and to support the use of the intellectual property and skills it has developed by UK industries across a variety of sectors.

35. CCFE's commitment to training and developing young scientists and engineers, and its contribution to the Culham/Oxford/Harwell triangle for innovation, are key to ensuring that the UK benefits from its investment in fusion technology.

36. The Authority will evolve after the end of JET operations – likely to be in the early 2020s. A portfolio of activities will continue i.e. the innovative MAST programme, RACE (robotics centre), nuclear materials (including the Materials Research Facility) and computing activities. This will be supplemented by an increased role in ITER, both through technical contracts and UK science participation in ITER operations. However, the Authority would also like to retain its unique nuclear engineering design capability. It is therefore pursuing a strategy to host the design integration centre for the first European fusion demonstration reactor. Should this not materialise it would aim to employ its design capability on the Government's nuclear fission activities, as outlined in the Nuclear Industrial Strategy.

Training scientists and engineers at the frontier of fusion research

37. CCFE has a strong commitment to train scientists and engineers in order to build and develop CCFE's skills base (and the skills base to support fusion research in the UK). It provides a 4 year Apprenticeship Programme (currently 18 apprentices); a 2 year graduate training programme; a 2 year post-doctoral training programme; and a 2 week plasma physics summer school.

38. CCFE's 4 year Apprenticeship programme provides approximately 1200 hours of training per apprentice (compared to approximately 650 hours in comparable schemes). CCFE are also planning to extend their Apprenticeship scheme, which currently has a 100% conversion rate to employment at Culham. The Apprenticeship programme has enabled CCFE to recruit into generalist fusion engineering roles that had been difficult to fill. Some private-sector apprenticeships in related areas are also supported by the CCFE's programme, and are highly regarded by their employers.

39. As well as the graduate and post-doctoral training programmes, CCFE has good links with over 20 UK Universities, with seven major multi-disciplinary collaborations. It also runs a public and educational outreach programme with around 1000 public visitors and over 1200 students visiting the site each year.

40. Academic stakeholders told us that CCFE's international reputation and the chance to work at a major facility such as JET or MAST acted as a major attraction for the brightest young scientists, and strengthened the UK's nuclear research base well beyond the boundaries of CCFE.

Managing the Authority's Property Portfolio

41. The Authority owns the freehold of the Culham Science Centre and the majority of the Harwell Campus in Oxfordshire. The Authority manages a campus development portfolio based around these sites, with the aim of continuing to develop these sites as world-class centres for science and technology in support of Government policy.

42. The Science and Innovation Strategy highlights the importance of cluster areas, such as Culham and Harwell to innovation and business growth in the UK. The Authority

has used its assets to create hubs which have the potential to unlock innovation and growth in the local area. Both sites have the opportunity to foster clusters of high tech businesses benefiting from highly skilled people, scientific infrastructure and reliable local markets, and as part of a larger strategy focused around Oxford, Harwell and Culham, to develop a major centre for innovation and growth.

43. David Willetts speech to the UK Science Parks Association:

"I am in no doubt that science parks are an important part of the research infrastructure in the UK - and an important part of our ambitions to be the best place in the world to do science… great science is of course worthwhile in its own right. But it also matters because it drives innovation. Which means it is absolutely key to our economic future… We want to be sure that we exploit our brilliant research to create a better future for our country."

Culham Science Centre

44. The Authority uses 70% of the space at Culham Science Centre in support of the fusion programmes and JET.

45. Approximately 30% of the space at Culham Science Centre is leased to a range of companies. Although some buildings are let in their entirety, most occupiers (tenants) are accommodated in multi-occupancy buildings (many of which are, in turn, linked together). This provides a business location for external companies in the science and technology field. The site is leased to a range of technology companies to ensure that Culham continues at the cutting edge of international fusion technology development and to develop and grow as a high technology business location offering high quality employment. This links the management of the property and businesses to the overall fusion programme.

46. By offering accommodation and high quality employment in a location that has close proximity to the UK fusion programme and the skills and experience on site, the Authority hopes to create an attractive offer for technology and science companies. In turn, this will support fusion research and the JET facility and will maximise the return to the Authority from property assets. More importantly, the development of Culham and Harwell sites and the Authority's scientific and technical contribution to supporting the businesses on those sites collectively allow the UK to maximise the benefits to the economy of the intellectual property and expertise developed by the Authority.

47. The ability to attract new occupiers to Culham Science Centre is important to the Authority's future business development strategy to build on their disciplinary strengths (remote applications, materials, design, advanced engineering, etc.). It is likely that organisations with potential business synergy with the Authority will be key to growing the business and employment base at Culham Science Centre. It is unlikely, though not impossible, that there will be single, large scale, investments by large corporate organisations in a presence at Culham Science Centre, due to its location and other factors. The Authority needs to approach the development of a coherent approach to the use of its property from the point of view of its long term strategic goals.

48. Culham Science Centre is a significant contributor to the local economy and is the third largest employment site in south Oxfordshire. The Authority is planning the redevelopment and growth of the site over the next 15 years.

49. It also runs a programme to help and advise UK companies bidding for fusion contracts, especially with ITER, and to identify and promote areas of technology transfer between fusion and industry.

50. This technology transfer is key to the long-term success of the UK in reaping the benefits of investment in fusion energy, and the Authority, together with its partners, will need to consider carefully how best to manage the Culham and Harwell sites with this in mind. In particular, the trade-off between maximising the opportunities for technology transfer to UK SMES and maximising the immediate benefit to the local area in terms of inward investment will need to be managed carefully.

Harwell Campus

51. The Authority owns the freehold of the majority of the Harwell Campus, which has been developed to build a strong interactive community of leading scientists and innovators. It provides fundamental research opportunities used by, and delivering benefit to, most scientific sectors. Over 4,500 people are employed at Harwell by 250 organisations. The campus is expanding, with several new facilities underway in 2014.

52. A Joint Venture, set up in 2008, is responsible for developing the campus and working closely with the wider stakeholder community to bring forward and implement relevant projects. Its role is to develop science, innovation and business property and to improve the economic impact of public and private investment in science as well as to help strengthen the science base at Harwell Campus.

Managing the Shareholder Programme Agreement

53. Historical liabilities and other non-fusion objectives are funded by the Shareholder Programme Agreement, which BIS funds by grant-in-aid. These commitments largely relate to historic liabilities that have remained the responsibility of the Authority after the restructuring of the public sector nuclear industry over a number of years. These are:

- The campus development programme for the management of non-NDA designated estates (i.e. Culham and parts of Harwell) and the cost of participation in the Harwell Science and Innovation Campus Joint Venture
- Historical restructuring costs from previous industry reorganisations, largely relating to continuing early retirement costs not borne by the pensions schemes
- New restructuring costs being incurred, as agreed with BIS, for implementation of their restructuring programme, aimed at reducing costs and the reorientation of the organisation
- Pension administration costs relating to legacy pensioners and deferred active pensioners arising from historic and more recent NDA restructuring
- The cost of their participation in the Compensation Scheme for radiation linked diseases and any payments made under the Scheme

- Payments made for uninsured non-radiologically derived liability in relation to occupational personal injuries and diseases arising from historic exposures (for example to asbestos)
- Liabilities under the Nuclear Installations Act in respect of occurrences prior to the date of the various Transfer Schemes which created Research Sites Restoration Ltd (RSRL), Dounreay Site Restoration Ltd (DSRL) and UKAEA Ltd.

54. The Authority also manages the Authority Pension Schemes for a number of employers. The Authority Pensions Schemes were established in accordance with the Atomic Energy Act 1954 as amended by subsequent legislation. They include:

- The Combined Pension Scheme (CPS)
- The Principal Non-Industrial Superannuation Scheme (PNISS); and
- The Protected Persons Superannuation Scheme (PPSS).

Structure and Governance of the Authority

55. The Authority employs approximately 680 staff and 470 Agency Supplied Workers in specialist areas. Of these, approximately 500 are employed by the JET programme, which also hosts around 350 visiting European scientists each year. The UK-led MAST fusion programme employs approximately 150 people.

56. The Authority is controlled through its Board (appointed by the BIS Secretary of State). The Board comprises of the Chairman, one Executive Director and three independent Non-Executive Directors, with the Chief Financial Officer in attendance. It is responsible for establishing strategic direction of the Authority within the policy and resources framework agreed with the responsible Government Minister; reviewing the Authority's corporate objectives and goals; approving the annual accounts, budget and corporate plan; reviewing and approving proposals to start new activities or to discontinue existing activities; ensuring that high standards of corporate governance are observed at all times; and reviewing the safety, environmental and security performance of the Authority.

57. Day-to-day running of the Authority is delegated to the Chief Executive, supported by senior managers, comprising the Executive Committee which meets monthly. Responsibilities include development of Authority performance measures; implementation of the strategies and policies as determined by the Board; monitoring of the operating and financial results against plans and budgets; and developing and implementing risk management systems.

58. The Chairman leads the Board in the determining its strategy and in the achievement of its objectives. The Chief Executive has direct charge of the Authority on a day-to-day basis and is accountable to the Board for the financial and operational performance of the Authority and its subsidiaries. The Chief Executive is also the Authority Accounting Officer and is responsible to Parliament through the Committee of Public Accounts and other Select Committees for the stewardship of resources.

59. The Non-Executive Directors constructively challenge and help develop proposals on strategy, and bring strong, independent judgement, knowledge and experience to the Board's deliberations.

60. More broadly, the Authority's strategic research direction is guided by a range of bodies – both national and international – with an interest in in the direction of nuclear research. They include: Engineering and Physical Sciences Research Council, Eurofusion, EURATOM and Fusion for Energy (F4E).

Budget

61. The Authority's budget for 2013/14 was approximately £99m, and was primarily funded by the European Union. (The Authority is 2/3 funded by the European Atomic Energy Community (EURATOM) and 1/3 funded by the Research Councils UK (RCUK)'s energy programme).

62. The Authority supplements EPSRC and EU funding in specialist technology areas through grants and contracts for research and development work awarded by the ITER Organisation direct or by the European Domestic Agency for ITER, Fusion for Energy (F4E). It will increase this supplementary funding further through contracts in the new Business Development Programme.

Table 1 – Summary of the Authority's income and expenditure years from 2011/12 to 2013/14

Income	2011/12 £m	2012/13 £m	2013/14 £m
EU funding including JET Operating contract, EU funded research and F4E/ITER contracts	48.5	63.0	61.8
UK funding including EPSRC grant, property income and other contracts	20.4	24.6	29.5
BIS direct funding for work under the Shareholder Programme Agreement	11.0	7.4	7.8
Total	**79.9**	**95.0**	**99.1**
Expenditure	**2011/12 £m**	**2012/13 £m**	**2013/14 £m**
Employee and	42.6	43.7	49.9

other Staff costs			
Materials and Consumables	12.3	17.4	18.0
Other External Expense	17.1	20.7	20.0
Other Expense	5.0	12.5	11.3

63. Also relevant is an Oxfordshire City Deal, which will see the UK government investing £7.8 million into a new Remote Applications in Challenging Environments facility (RACE) at Culham in 2014/15.

64. The Authority relies on funding from the European Commission to finance the operation of the JET programme. A new contract between the Authority and the Commission for the operation of JET, signed in June 2014 and backdated to 1 January 2014, covers a five year period to 31st December 2018. The commitment of Europe to fusion research is evidenced by the contract.

65. The closure of the JET project will have a significant impact on the Authority's budget. However, the Authority is hoping to replace this funding stream through its business development plan which will see the Authority contracting for work to support and develop ITER and other related advanced technology opportunities. A Capability and Capacity review is currently underway within the Authority to prepare for the future changes to staffing profile at the end of JET.

3. Review stage 1: is the Authority needed as a NDPB?

66. This section sets out the detailed findings, conclusions and recommendations from Stage One of the Triennial Review of the UK Atomic Energy Authority. It makes formal recommendations on the functions and appropriate forms of the Authority. It should be noted that this is not a review of Government policy relating to fusion research.

Stage 1 Process

67. In line with Cabinet Office guidance, the first stage of the review identifies and examines the key functions of the Authority. It assesses how the functions contribute to the core business of the Authority and the sponsor department, and considers whether the functions are still needed. Where the conclusion is that a particular function is still needed, the review should then examine how this function might best be delivered.

68. The review therefore includes an assessment of the Authority's key functions against the Government's 'three tests' for the NDBP delivery option:

- Is this a technical function (which needs external expertise to deliver)?
- Is this a function which needs to be, and be seen to be, delivered with absolute political impartiality (such as certain regulatory or funding functions)?
- Is this a function which needs to be delivered independently of Ministers to establish facts and/or figures with integrity?

69. The review then examines a range of delivery options:

- Abolish
- Move out of Central Government (e.g. to the voluntary or private sector)
- Bring in-house (e.g. to an existing Executive Agency of BIS)
- Merge with an another body
- Delivery by a new Executive Agency
- Continued delivery by an NDPB

70. The review assesses each of these options and, where appropriate, includes a cost and benefit analysis.

Stakeholder engagement

71. The review team visited the Culham Centre for Fusion Energy on 14 August 2014 and met with the Authority's management team to discuss the proposed outline for the review. We subsequently met twice more with the management team, and attended two board meetings.

72. A consultation survey (attached at Annex A) on the Triennial Review was sent to stakeholders of the Authority on 14 October 2014, setting a response deadline of 11 November 2014. It was also sent to the heads of the various Parliamentary committees with an interest in the Authority's activities. Those stakeholders consulted are listed at Annex B.

73. We received 7 electronic responses from representatives across all stakeholder groups. The low response rate to the consultation is reflective of the fact that the work that the Authority carries out is of a technical nature with limited outreach outside of the nuclear fusion and fission communities. Most key stakeholders were interviewed directly and may not have felt the need to complete a survey in addition to this.

74. The Triennial review team also conducted 14 interviews with stakeholders including academics, scientific advisors in UK government, representatives from the European Commission, local authority representatives from Oxfordshire and Vale of White Horse, the stakeholder team responsible for the National Nuclear Laboratory (NNL), The Department for Energy and Climate Change (DECC), the Engineering and Physical Sciences Research Council (EPSRC) and the Science and Technology Facilities Council (STFC). We also held stakeholder workshops with key interest groups: one with apprentices and PhD students based at Culham, and another with local stakeholders and businesses based at the Culham Science Centre and at Harwell Oxford. These stakeholders are listed at Annex B.

75. This report draws on all these sources of evidence, together with desk based research carried out by the Triennial Review team. The Authority has been much-reviewed in the recent past, and we have been able to draw on the work of a number of other teams – together with information on the costs and benefits of shifting to different models in similar organisations - to inform our recommendations on the preferred modes of delivery.

Analysis of the functions of the Authority

Test 1: is this a technical function which needs external expertise to deliver?

76. This section examines whether or not the functions that the Authority performs are 'technical' in that they require specialist skills and expertise and, if so, whether or not the Authority possesses the necessary skills to complete the functions to a high standard.

Delivery of Sustainable Fusion Energy

77. The facilities owned by the Authority as part of their fusion delivery programme and the skills developed by its staff over many years offer the UK a strong comparative advantage in the field, and are key to international developments in fusion research. Stakeholders stressed the importance of retaining this research in the UK; the potential benefits to the UK of fusion energy are immense, even if they are only realisable in the long-term.

78. The work that CCFE is carrying out to deliver fusion research energy, particularly through the contributions that JET and MAST are providing to the ITER facility, requires technical competencies and a highly trained and skilled workforce, together with an extremely high degree of competence in delivery of major projects and a strong skillset in design engineering. Stakeholders tell us that this combination of skills is unique to the Authority, has been developed over a long period of time, would be extremely difficult to replicate and has strong spin-off benefits for the UK economy outside fusion.

79. The Authority hosts a meaningful associated talent pool of highly skilled UK and international scientists and support staff. It is recognised internationally as a key research centre in this area, with a history of important science. It acts as a "halo" site within Oxfordshire, which is itself one of the three parts of the London, Cambridge, Oxford knowledge economy known as the "Golden Triangle".

80. JET is by far the largest European science facility in the UK and is the most promising of all fusion projects running globally at the moment. The project is on track to break its own records again in 2017-2018 (with the use of tritium, a radioactive isotope of hydrogen). MAST is also a world-leading instrument which also has broader science applications.

81. The possible commercial gains from delivering sustainable fusion energy would be massive, particularly as the UK currently has a strong comparative advantage in fusion technology as a result of the Authority's work. Nevertheless, it is important that this work stays within Government for the foreseeable future. All stakeholders agreed that this is an area that is not yet suited to private sector funding, as the risks are too high and the benefits, though large, too long-term. Some suggested that this might change quite rapidly if certain key results were delivered, and that the UK is at present in a unique position to benefit in that case.

82. The project management and design engineering skills required to run these major programmes and to ensure the UK is able to leverage EU funding effectively are not readily available within academia; the conclusions of the EPSRC's 2009 review that there is no good academic home for the Authority's functions still hold while JET remains viable.

Ensuring the maximum benefit to the UK from the ITER and other related advanced energy and technology opportunities

83. ITER contracts create opportunities for UKAEA to fill knowledge gaps in the private sector, while the private sector provides the expertise and leadership on commercial development and delivery. For example, some work on applied materials and remote handling has potential applications in many other sectors and industry.

84. Without the technical skills and experience in carrying out fusion research which have been developed and maintained within the authority, the UK would not be in a position to bid for and win these projects, and to leverage funding of fusion research with international funding.

85. In addition, some of these skills are strongly transferrable to the rapid development of fission energy – in particular, the Authority's pool of design engineers could form a key resource for the development of small fission reactors within the UK, should the funding be available for such development.

86. There are international examples of the benefit to economy from early adoption and research in to alternative power sources. Denmark's early successful adoption of wind turbines to generate power in the 1980s has led to them having the largest wind turbine market in the world, with 90% of the output of that market exported. In France, investment in the Nuclear industry in the 1970s has led to their current dominance in the development of new Nuclear power plants through EDF (Electricite de France).

87. The UK has an early comparative advantage in fusion energy and the Authority has an excellent international reputation. Even with the closure of JET in the future, it is likely that the Authority will be well placed to supply skills and research needed globally in this area of international scientific endeavour.

Training scientists and engineers

88. The Authority needs an appropriately skilled workforce to support the delivery of fusion energy. Through its training function, the Authority is not only ensuring that it has the necessary capabilities to carry out fusion research, it also supports the Government's growth agenda through the training and development of the new generation of scientists and engineers. The Authority's Apprenticeship Programme, graduate training schemes, PhD and research fellowship opportunities are supporting the younger generation, and encouraging them into engineering and R&D professional careers.

89. There are up to 80 PhD students at Culham at any given time, making Culham larger than many university graduate physics departments. These students will help to fill a substantial gap in 'nuclear skills'. The average age for an individual with the necessary skill set to work on JET and MAST is around 50. And the UK is not unique in having this skills gap – this is a global problem.

90. The very high quality of the Authority's training and Apprenticeships is widely recognised and as the skills developed working on the JET and MAST programmes are transferable to the fission industry, this also helps to address a similar skills gap in this area.

91. The quality of the training that the Authority provides was reflected in the views of the students and apprentices that the Triennial Review team met with. PhD students studying with the Authority felt that the training they received surpassed their expectations. They felt that the pace was faster than in a university environment and they were impressed by the key role that PhD students played in the major work and projects being carried out. They were given a lot of responsibility in comparison to universities. For example, being able to join weekly staff meetings had huge benefits to the students who were able to get a lot out of the information exchange involved. PhD students also benefited from the ability to do experiments on a large scale,

which is not possible at universities. There was also evidence that PhD students had chosen their PhD studies based on the fact that their university had ties to CCFE.

92. The PhD students also felt that their work had to be somewhere that can run large scale experiments and train people to lead on large scale experiments and projects, which is particularly important in training the next generation of leaders in fusion.

93. The Authority is addressing the national need for a more technically skilled workforce through their apprentice and graduate training schemes. The level of enthusiasm seen in the Apprentices that the Triennial Review team met with was extremely high and so far 100% of the apprentices have stayed in CCFE after completing their work. Though it should be noted that the Apprenticeship Programme is still a relatively new programme and there is potential that, if expanded, apprentices trained by the Authority could also provide needed skills into the private sector. The Apprenticeship Programme covers a large variety of skills that are needed on site – including vacuum (theory and practice), design, electronics, robotics, and project management. Apprentices currently undertaking an apprenticeship felt that the range of skills and areas they were exposed to were greater in CCFE than other opportunities that were open to them.

94. One issue which was highlighted to the Triennial Review team was concerns about the local college which CCFE partners with to provide courses. CCFE is investigating developing its own college on site. Despite this, the Apprenticeship scheme at CCFE has consistently won awards including the National Apprenticeships Service Thames Valley Regional Award in 2014 and it is has been recognised in the top 100 Apprenticeship Employers list for 2014.

95. Retaining many of the people the Authority trains, particularly engineers, is a major challenge for the Authority. This is largely driven by public sector pay rates, which depress the Authority's salaries well below market rates. For example, the salary the Authority can offer a power engineer is 70% of the market rate, and the Authority is competing with a number of competitive employers, such as BMW, in the area. The Authority carries out exit interviews to review reasons for leaving.

96. The Triennial Review team also heard from stakeholders that there were other factors beyond salaries also pushing people to leave the Authority. In some cases, the layers of bureacracy in the Authority (built up over a number of years), formed a significant factor in the employees' decisions to seek other employment.

97. Stakeholders also felt that Government could support CCFE to extend its outreach work and ensure that there is greater uptake of the opportunities that are offered at the Authority.

98. It is important the Authority continues to train skilled engineers and scientists – both to ensure the Authority doesn't suffer from the potential skills gap in these fields, but also expand the supply of highly skilled young engineers in an area which is of key importance to the UK – both within the Authority and within the Private Sector. The Authority should therefore look to extend its Apprenticeship Programme, for example by developing on-site training facilities and working with other organisations to meet their apprentice training needs.

Managing the Authority's Property Portfolio

99. The Authority owns the freehold of the Culham site, and the majority of the Harwell site. At Harwell, the nuclear licenced site is designated to and leased to the Nuclear Decommissioning Authority (NDA). It is the legal duty of their operator, RSRL, to operate that part of the UKAEA property at Harwell. At the Culham Science Centre the Authority has a duty as owner/operator to ensure that its own operations are carried out properly and that the site as a whole is managed properly for all those that work at or visit it. At the end of JET operations, it is currently envisaged that designation to the NDA will take place for the decommissioning of the designated buildings. The Authority also manages the property development of both areas as science parks.

100. The space designated for commercial development at Harwell Campus is owned by the Authority and managed by the Authority and as part of the Joint Venture between a private sector partner and the public sector as represented by the Authority and STFC. The joint venture manages the commercial space which amounts to approximately 40% of the site. Approximately two-thirds of the employment at Harwell is, at present, in space not managed by the joint venture. STFC and Public Health England own the freehold of their sites and manage these separately from the Joint Venture. The Authority's oversight of this site is very different to the management of Culham Science Centre, which is more directly managed by the Authority's staff.

101. The Authority has started work on a new property strategy in 2013 which will, in parallel with the massive changes in the fusion programme (including the closure of JET), enable the Authority and commercial use of Culham Science Centre to be zoned and structured in a way that will enable more focussed management and eventually the involvement of the private sector. The Authority expects that this programme will last for ten years, whereas the Triennial Review team consider that there would be benefits in significantly reducing this timetable.

102. The oversight of the Culham Science Centre and Harwell Campus has the aim of ensuring that the Authority continues at the cutting edge of international fusion technology development and ensures technology transfer to UK SMEs is maximised by developing a high technology business location. Having a view of the site management and development at the site, in the Authority's view, ensures that development and management is responsive to the Authority's research, contract or grant needs. If this was left to another site manager, they may not understand or share the goals of the Authority.

103. These sites as science parks have a number of benefits; tenants explained at a stakeholder workshop that they had been able to expand on site because of their close proximity to the Authority. Because of the skills, facilities and expertise that can be found on site, it has acted as a breeding ground for a number of highly innovative companies. Companies appreciate the attractiveness of the site as a result of its proximity to CCFE. As a result, these companies have been able to benefit from the knowledge sharing and cross-fertilisation of ideas with the Authority and other companies on site; they can attract people to come on secondments and placements due to the close proximity to the Authority's nuclear fusion programme; it is possible

for them to conduct experimental operations that would not be possible on other science parks; and they benefit from the high level of security at Culham which is particularly attractive for companies that have Intellectual Property concerns.

104. The existence of the Culham Innovation Centre was thought to be important in this regard and to make a real difference to new companies coming to Culham, encouraging collaboration to take place.

105. However, there were some issues with the Authority's role in managing the Culham Science Centre. Stakeholders felt that the Authority does not have appropriate property management skills to ensure that companies on the site receive a high level of service. In general there is a lack of communication from CCFE with its tenants and it can be difficult for companies to get things done (both in terms of getting information from CCFE, but also in getting approval to conduct certain activities or experiments on site – although stakeholders recognised that communication with the Authority was improving. In general, it is felt that the property management side is lacking in the offer that the Authority has for its tenants.

106. In contrast, the property management of the Harwell site seemed to tenants to work much better than at Culham. Tenants suggested that this was a function of the service mentality expected from the private sector. One example of this differing service level was that if a tenancy within the Innovation Centre becomes available at Harwell, the private sector partner rapidly lines up new tenants; the approach at Culham is more hands-off. Both the Authority and the local authority most directly involved with the Harwell partnership noted that the partnership had not been trouble-free, and that it would be important to learn from the experience in establishing a partnership of some sort at Culham.

107. Managing the Authority's property portfolio and balancing the immediate needs of the local area with the longer-term need to ensure returns on the UK's investment in fusion technology, is a core part of delivering the Authority's long-term mission, and it is important both that the Authority retain this function and that it works with private and public sector partners to maximise benefits to the UK as a whole.

Managing the Shareholder Programme Agreement

108. Links to the Authority's core activities are not strong, but government must continue to manage its obligations, both in terms of pensioners and nuclear liabilities; the Authority has run them well and it has the historic knowledge to continue to do so. Given that the programme is likely to decline over the coming years, as both the population of retired employees and the extent of remaining liability declines, we recommend that the Authority retain these functions for the remainder of their life.

Does the Authority have the technical expertise necessary?

109. The Authority has the best collection of skills and experience in the field of fusion energy in Europe and, arguably, in the world. This is in spite of challenges such as skills in this area being spread thinly due to a lack of investment globally.

110. One stakeholder commented in the consultation that “the Authority's senior Executive Team and Board are competent and impressive.”

111. One of the key issues facing the Authority is the recruitment and retention of highly skilled staff. Over the last few years there has been a gradual rise in the number of vacancies as staff have left or retried and they have found it difficult to replace them in competitive, highly paid and skilled areas. Under its current structure as an NDPB, the Authority is unable to pay its employees competitive salaries in engineering roles. The Authority is also working to address any skills gap in this area in their training and Apprenticeship programmes to ensure the Authority does not lose its capability as a leader in fusion energy.

112. The Triennial Review team concludes that research into delivering sustainable fusion energy is a function that should continue to be carried out in the UK. The potential benefits of delivering sustainable fusion energy are immense, and by ensuring we retain the necessary skills and experience in the UK, we will be able to get the benefit here in the UK.

113. The skills needed to complete this work are of a highly technical nature and the Authority is the only body in the UK that is currently capable of carrying out this work. This work should therefore be carried out at Culham because of the technical expertise that is has.

114. The other functions are therefore also needed to support the Authority’s overarching function of delivering sustainable fusion energy. Without the skills and expertise that is developed by the Authority as part of its research into fusion energy, the Authority would not be able to build on this research base into other related areas, allowing it to seek other funding sources and to maximise benefit to the UK from the ITER facility and other related advanced energy and technology opportunities. The skills and training work that is being carried out by the Authority is imperative to ensure that the appropriate skills and experience are developed in the UK to carry out further research into nuclear fusion, and other related fission activities.

115. There is also benefit in the Authority’s continuing its role in management of the Culham Science Centre and ownership of the majority of the Harwell Campus, both in the benefits it brings to UK businesses being situated in close proximity to the Authority, but also in the spin off research and innovation that occurs on site. However, in light of the success of the Joint Venture at Harwell, a different model (some form of public and private partnership) should be considered for the Culham Science Centre.

116. The legacy work that is carried out under the Shareholder Programme Agreement is also necessitated by law and the Authority is best placed to carry out this work as it has the expertise and historical knowledge to do so.

117. As a result, the Triennial Review team concludes that the functions of the Authority are necessary and that they meet the criterion of technical expertise. That is, the functions the Authority performs are ‘technical’ and they require specialist skills and expertise to be carried out. The Triennial review team also concludes that the Authority possesses the necessary skills to complete the functions to a high standard

and, in fact, there are currently no other bodies in the UK that would be able to carry out these functions.

Test 2 and 3: Is this a function which needs to be, and be seen to be, delivered with absolute political impartiality and is this a function which needs to be delivered independently of Ministers to establish facts and/or figures with integrity?

118. This section examines whether the Authority performs a function which meets the criteria of tests 2 and 3. As it has been concluded that the Authority's functions meet the criteria in test 1, these tests will not be assessed in the same detail.

Political Impartiality

119. From views we received from stakeholders it was considered that although political impartiality is of benefit to the functioning of the Authority, it was not seen as an issue of high importance.

120. The main advantage of ensuring the Authority's work is delivered with absolute political impartiality is that, given that fusion energy research is a long-term activity, this should not be influenced by the politics of the day.

Stakeholder Comments received:

"The Authority's senior Executive Team and Board are competent and impressive. Ministerial prioritisation of this activity is welcome but that does not imply any pressing need to insert the Authority into a Government Department."

Need for independent delivery to establish facts and figures with impartiality

121. As with political impartiality, it was also deemed important that this work be independent of Ministers. However, due to the nature of the research being undertaken, there was no evidence that the work needed to be delivered independently of Ministers to establish facts and figures with impartiality.

Conclusion on the three tests

122. The Triennial Review team therefore proposes the following conclusions:

Test	Conclusions
Technical function needing external expertise	This test has been met. Delivering sustainable research is a function that should continue to be carried out in the UK. The skills needed to complete this work are of a highly technical nature and the Authority is the only body in the UK that is currently capable of carrying out this work. This work should therefore be carried out at the Culham Centre for Fusion Energy because of the technical expertise that is has. The other functions are therefore also needed to support the Authority's overarching function of delivering sustainable fusion energy. The functions of the Authority are necessary and they meet the criteria of technical expertise. That is, the functions the Authority performs are 'technical' and they require specialist skills and expertise to be carried out. The Triennial review team also concludes that the Authority possesses the necessary skills to complete the functions to a high standard – though an alternative model should be considered for delivery of the Authority's property management.
Political impartiality	There is some value in the Authority's functions having political independence, but this is low in importance.
Establishment of facts and figures with integrity.	This test has not been met. Due to the nature of research into fusion energy, there is little risk of facts and figures being established without integrity if they are not independent from Ministers.

Analysis of the optimum organisational form of the Authority

123. On the basis of the conclusion that the Authority's functions remain of value, we explore below the alternative structures within which the functions of the Authority could be carried out. The models offered are those set out in the Cabinet Office guidance on Triennial Reviews.

Table 2 – Summary Analysis of organisational form

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
Abolish	N	N	N	N	N	The UK has a strong comparative advantage in the field of nuclear fusion and the Authority plays a key role in international developments in fusion research. Stakeholders stressed the importance of retaining this research in the UK. Furthermore, the potential benefits to the UK of fusion energy are immense, even if they are only realisable in the long-term.
Maintain the status quo	Y	Y	Y	N	Y	The Delivery of Sustainable Fusion Energy should be maintained in its current organisational form at least until the existing JET contract is complete. This should also be the case for the functions that the Authority carries out working towards this aim – ensuring the maximum benefit from ITER and other opportunities, training scientists and engineers and managing the Shareholder

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
						Programme Agreement. This has the benefit of continuity and the use of existing structures in place within the Authority, as well as utilising the Authority's capability in science and project management skills. There are some risks, however, in terms of the ability of the Authority to recruit and to pay a competitive salary. For managing the Authority's Property Portfolio the Triennial Review team recommends that some form of public and private partnership should be established at the Culham Science Centre, with a view to maximising the efficiency and customer focus of activities on the site, and to focusing more strongly on developing a vibrant and innovative business community in the area.
Move out of Central Governmen t (e.g. to the voluntary or private sector)	N	N	N	Y – via joint vent ure	N	It is not currently viable for the functions that are carried out by the Authority to be done by the private or voluntary sectors. "The overall goal of fusion is so big, important and long term that only a government could do it." There may be some benefits for the functions to be carried out by the private

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
						sector, such as presumed efficiencies, project management skills and that a private sector might be more attractive as an employer. However, this is not currently viable as a business model. A private sector company is less likely to continue to do this research as the commercialisation is only realisable in the long-term. Therefore not many companies would take up the finanacial or the reputational risks. "Private sector capital will not deploy itself in the same way and will be far more short term in terms of investment payback time horizons." Also, no voluntary sector body or university would have the capability to carry out this work. A private or voluntary sector body is also less likely to meet the strict requirements for EU funding. "The fusion programme is at present not yet right for a private sector operator and is too large a scale for a single University operator. The present model functions well with good interaction with a range of Universities, without prejudice or exclusivity." There is also a risk that moving the Authority's functions out of Government and into the private sector, would mean that the skills and capabilities would

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
						leave the UK. "The UK is working on Fusion within an international collaboration, but there is still Intellectual Property that the UK can retain and protect." There is however scope for the managing of the Authority's property portfolio be shared with the private sector in a joint venture.
Move out of Central Governmen t (e.g. to an academic institution)						The Academic sector in the UK does not have the required project management skills to run science projects on the scale that is run by the Authority. The largest national research facility that is owned and run by an academic institution is Jodrell Bank, which is managed by Manchester University. The rest of the national laboratories are run as consortiums between universities and the STFC. The 2011 EPSRC report investigated the possibility of transferring the CCFE to University control, and found no institution which felt itself willing or able to take on the management of the Authority's facilities. Discussions with stakeholders including EPSRC and various universities suggest that this position has not

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
						changed.

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
Bring in-house (e.g. to an existing Executive Agency of BIS)	N	N	N	N	N	Bringing the Authority in-house would make less effective use of its unique skills and reputation than a merger, though one stakeholder commented that: "There could be some advantages in clearer strategic direction and government support by being an executive agency. Fusion research has long been restricted by limited funding and over-zealous partitioning of funds." As we are recommending that the Authority should consider a merger with another body, there is no case to change the delivery model from an NDPB to an Executive Agency in the meantime. In addition, the financial requirements placed on Executive Agencies by HM Treasury would be difficult to manage alongside the Authority's current funding model as the requirement to produce a return on investment clashes with EURATOM's funding rules. A future agency model would depend on a business model which was likely to produce a reasonably stable cash-flow and this has historically been difficult in the European context.

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
Merge with another body	Y – in the long term	Y – in the long term	Y – in the long term	Y – in the long term	Y – in the long term	This is an option that should be explored seriously now with a view to including the merger in plans for the Authority's medium to long term future; none of the proposed partners in a merger have the skills or the appetite to take on JET as it stands, but delaying planning until JET closes is clearly not sensible. Nevertheless, the possible strategic benefits of a merger with another NDPB mean that this should be considered very seriously by Government. Potential partners in a merger include GO-Science, EPSRC, STFC, Universities or NNL; based on discussions with stakeholders and previous reviews carried out, the strongest strategic benefits would be derived from a merger with NNL or STFC, the former also offering some tactical advantages. The initial costs of such a merger are high both in terms of staff morale and in terms of the resource required to plan and execute a successful merger, and are quite finely balanced against the likely strategic benefits. There are also some risks to the Authority's international reputation and to the UK's reputation around both fusion and fission.

Delivery model	Delivery of Fusion Energy	Ensuring UK benefit from ITER and other opportunities	Training Scientists and Engineers	Managing the Authority's Property Portfolio	Managing the Shareholder Programme Agreement	Comments
Delivery by a new Executive Agency	Y – in the long term	Y – in the long term	Y – in the long term	Y – in the long term	Y – in the long term	As the Authority's income streams diversify post-JET, it should seriously consider a move to a Government Company (GovCo), as this could create benefits in terms of recruitment, retention, and management of UK intellectual property. While its major income stream derives from EU funding of JET, however, this is extremely unlikely to be a viable model: Possible EU constraints on JET funding would make a GovCo model very difficult to maintain in practice. The fact that NNL is a GovCo means that it might be possible to deliver some of these tactical benefits earlier via a merger with NNL.

124. The Triennial Review recommends that the Authority as a body should not be abolished. The work it carries out is important to nuclear fusion research and it is of benefit to UK plc, both in terms of maintaining a comparative advantage in nuclear fusion and in developing and maintaining the necessary knowledge and skills in this area in the UK. The UK has a strong comparative advantage in the field of nuclear fusion and the Authority has a key role to play towards international developments in fusion research. Stakeholders stressed the importance of retaining this research in the UK as the potential benefits to the UK of fusion energy are immense, even if they are only realisable in the long-term. Moreover, the Authority has an international reputation that would be difficult to replicate.

125. We recommend that the Government, the Authority, and possible partners investigate in more detail the possibility of a much closer alignment or merger with either the NNL or the STFC. This would most likely be alongside the major change entailed by the end of the existing JET contract, though the Authority, BIS and possible partners should also consider the possibility of a merger from 2018 irrespective of whether the JET contract has ended. The NNL could create a larger national laboratory with a higher international profile, and with expertise in both fission and fusion technology which would provide a good platform on which to build the UK's future exploitation of fusion technology. This option also offers the possibility of a merger with a Government Company (GovCo) which may provide some support in achieving process efficiencies. The STFC would offer clear synergies around the management of the Harwell and Culham sites and addressing some of the engineering challenges inherent in the development of nuclear energy over the next two decades. It would also offer opportunities to streamline and improve links to innovative small businesses and to exploit technologies developed by the Authority. Government, the Authority and possible partners should commence work now to determine the best option with a view to assessing the options by end 2016 and implementation from 2018.

Possible Mergers

126. The advantages and disadvantages of the two possible mergers are summarised in Table 3, and are explored in more detail in the subsequent discussion.

Table 3. Analysis of mergers with STFC and NNL

	UKAEA	STFC	NNL
Staff numbers	585 full time equivalent (FTE) employees in 2013/14 Plus an average of 413 (FTE) agency workers	1,723 (this includes all permanent, fixed term and temporary staff of all types who are paid as employees through their payroll)	785 staff (682 employed in the scientific, technical, engineering and facilities capacity and 103 employed in an administrative capacity)
Median salary	£39.5k (including salary, performance-related pay and benefits in kind)	£39.7k (average salary – median salary information unavailable)	£45.7k (average salary – median salary information unavailable)
Budget	UKAEA had a budget of approximately £100m in 2013/2014. 2/3 of the budget is funded by the European Atomic Energy Community (EURATOM) and 1/3 is funded by the Research Councils UK (RCUK)'s energy programme.	STFC's funding for FY 2015/16 is £529m[3] (of which £400m is allocated to resource and £129m is allocated to capital spending).	As a limited company, NNL generates its own revenue. Their revenue of £85.4m in 2014 was generated entirely from the sale of their services both in the UK and overseas

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/278326/bis-14-p200-science-and-research-budget-allocations-for-2015-to-2016.pdf

	UKAEA	STFC	NNL
Advantages of merger		A merger between STFC and UKAEA would: • offer clear synergies around the management of the Harwell and Culham sites and address the engineering challenges inherent in the development of nuclear energy over the next two decades • provide a more strategic and cohesive approach to the UK's management of public investment in large scientific facilities • bring about better coordination between the two bodies which could mean the spin-off benefits of fusion research – in both pure science areas such as astronomy and applied science/engineering areas including materials science could help foster world class research and innovation. • help fill the gap in the UK's nuclear skills by aligning their different training programmes • enhance their shared agenda and existing collaborations.	A merger between UKAEA and NNL would: • offer the chance to set a clearer strategic direction for the development of nuclear science and technology, and to establish a stronger international reputation for the UK in nuclear research • greatly enhance the commercial opportunities for the Authority's strong research capability in areas such as materials research, modelling & neutronics, tritium handling and robotics & remote handling. • enhance collaboration in technical areas of common interests, particularly in the development of an integrated R&D capability in certain areas • potential gains in a combined admin, procurement and IT system

	UKAEA	STFC	NNL
		They are currently partners (along with the property group Goodman) in a joint venture to develop Harwell-Oxford, a major science, innovation and business campus	
Risks of merger		• The sheer diversity of the Council's portfolio means that a merger could lead to the Authority losing its unique identity as the sole UK organisation tasked with delivering sustainable fusion energy. • If poorly managed, a merger could pose risk to the authority's strong international reputation both in fusion research and in other technologies.	• A merger might not work in practice. UKAEA and NNL are two very different organisations with two very distinct missions. Most of the work done by NNL centres around decommissioning and reducing the cost of nuclear clean-up whilst the Authority work centres around the advancement of fusion science and technology. • As NNL is a private limited company, a merger may require a change in the operating/ownership structure of the of UKAEA

Science and Technology Facilities Council

127. A merger between the Authority and the Science and Technology Facilities Council (the Council) would offer clear synergies around the management of the Harwell and Culham sites and help to address the engineering challenges inherent in the development of nuclear energy over the next two decades. A merger would also provide a more strategic and cohesive approach to the UK's management of public investment in large scientific facilities.

Scale and scope

128. The remits of a post JET merger of the Authority and the Council seem relatively closely related – with one advancing fusion science and technology and the other, a multi-disciplinary science organisation, supporting particle and nuclear physics. A better coordination between the two bodies could mean that the spin-off benefits of fusion research – in both pure science areas such as astronomy and applied science/engineering areas including materials science could help foster world class research and innovation.

129. Both organisations provide extensive training to physicists and engineers through apprenticeships and graduate training schemes. The Authority's Culham Centre for Fusion Energy also provides a post-doctoral training for physicists. There is scope for better coordination and alignment of their different training schemes, helping fill the gap in the UK's 'nuclear skills'.

Shared Agenda and existing collaboration

130. The Authority and Council are partners (along with Harwell Oxford Developments Limited) in a joint venture to develop Harwell-Oxford, a major science, innovation and business campus. Harwell will work with some 150 organisations including key UK Research Councils, start-ups and multi-national organisations focusing on a range of commercial applications including healthcare, medical devices, space, detector systems, computing, green enterprise and new materials.

131. However, the sheer diversity of the Council's portfolio means that a merger could lead to the Authority losing its unique identity as the sole UK organisation tasked with delivering sustainable fusion energy.

Potential costs savings

Staff

132. The Authority had an average of 585 full time equivalent (FTE) employees during 2013/14. In addition, an average of 413 (FTE) agency workers were employed during

the same period. The median total remuneration (including salary, performance-related pay and benefits in kind) for the Authority's employees was £39.5k[4].

133. The Council in contrast counts the number of staff to include all permanent, fixed term and temporary staff of all types who are paid as employees through their payroll. On that basis the average number of full-time equivalent staff in 2013/2014 was 1,723. This also includes locally-engaged staff based overseas. The average salary at the Council[5] at £39.7k[6] is not too dissimilar to the median total remuneration at the Authority.

134. At the Authority, the average age for an individual with the necessary skill set needed to work on JET and MAST is around 50 whereas the average age of employees at the Council is 45[7].

Estate Management

135. Approximately a third of the Authority's Culham building stock is leased commercially to external companies, mainly in the science and technology sectors consistent with their corporate strategy[8]. Almost 50 external businesses are located at Culham, including the start-up companies in the Culham Innovation Centre. Occupancy of the commercial property has remained high at around 90%. The commercial property portfolio is managed on site by a professional team within the Authority.

136. The Council's estate management on the other hand is carried out by their Corporate Services team. The Council earns rental income in respect of tenancy agreements at both Daresbury and Rutherford Laboratories.

Other potential costs

137. There could be other potential costs arising from the merger. By way of example, the merger of Particle Physics and Astronomy Research Council (PPARC) and the Council for the Central Laboratory of the Research Council (CCLRC), which created the Science and Technology Facilities Council (FTSC), itself had an immediate cost of around £0.5m and an estimated overall cost of between £5m-£10m[9]; the effects of the merger are still being worked through.

138. A merger could also pose a risk to the authority's strong international reputation both in fusion research and in other technologies, if it were seen as a takeover of the Authority by its partner; in any merger maintaining the Authority's reputation and status would be an important consideration.

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[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330689/UKAEA_annual_report___accounts_2013-14_-_web_version.pdf
[5] The only possible measure available from the information in their 2013/14 Annual Report
[6] Total salary and wages of (£68,387,000) divided by average number of FTE staff (1,723). Information on page 77 – https://www.stfc.ac.uk/files/3237/3237_res_1.pdf
[7] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330689/UKAEA_annual_report___accounts_2013-14_-_web_version.pdf
[8] Ibid
[9] Ibid

Budget

139. Two thirds of the Authority's fusion programme at Culham is funded by the EURATOM and a third is funded by the Research Councils UK (RCUK)'s energy programme. The Authority supplements its EPSRC and EU funding in specialist technology areas directly through grants and contracts for research and development work awarded by the ITER Organisation or by the European Domestic Agency for ITER, Fusion for Energy (F4E). The Authority will increase this further through contract work in its new Business Development Programme.

140. The Council on the other hand receives substantial funding from the UK Science Budget through its sponsor department BIS. In addition, it receives further funding from the UK Research Councils as well as external bodies including higher education institutions, the European Commission and private sector organisations.

National Nuclear Laboratory

141. A merger between the Authority and the National Nuclear Laboratory (NNL) would offer the chance to set a clearer strategic direction for the development of nuclear science and technology, and to establish a stronger international reputation for the UK in nuclear research. NNL plays a crucial role in the coordination of the UK's nuclear research and development and maintain close links with academia and industry. NNL's activities would therefore complement the Authority's nuclear fusion and fission research programmes.

Scale and Scope

142. NNL provides an extensive and integrated range of technology services and solutions across the nuclear fuel cycle. As part of the wider announcement on the government's Nuclear Industrial Strategy, NNL's mission was restated by giving it particular emphasis on supporting UK national programmes across the civil nuclear sector[10]. The activities of the Authority broadly fall under this scope.

143. The Government spends around £30 million each year on nuclear fission R&D, the majority of which is channelled through the Research Councils, particularly the Authority[11]. As the UK looks to increase its commercial opportunities in the nuclear market, a much more effective coordination of R&D is needed. As the NNL is more commercially-minded, a merger could greatly enhance the commercial opportunities for the Authority's strong research capability in areas such as materials research, modelling & neutronics, tritium handling and robotics & remote handling. The report on the UK's Nuclear Industrial Strategy acknowledged the vital role played by NNL in identifying areas of commercial opportunities for UK manufacturers as well as assisting the government and industry in helping understand the global commercial opportunities.

[10] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168048/bis-13-627-nuclear-industrial-strategy-the-uks-nuclear-future.pdf
[11] Ibid

144. It must be noted that NNL is a private limited company that is wholly owned by DECC through a holding company, NNL Holdings Limited. A merger might therefore require a change in the operating/ownership structure of the Authority[12].

Shared Agenda and existing collaboration

145. The NNL considers the Authority as one of its major customers[13]. The Authority's CCFE and NNL are both fusion and fission national laboratories and can work together in technical areas of common interests. The Nuclear Industrial Strategy report stated that CCFE and NNL will establish a series of technical workshops, involving academia and industry, to develop an integrated R&D capability in certain areas[14]. A key recommendation in the report was the establishment of a £15m National Nuclear Users Facility (NNUF)[15]. The NNUF will be centred at three complementary hubs; the Authority's CCFE, the NNL and the Dalton Cumbrian Facility of the University of Manchester.

146. The Oxfordshire City Deal which will see a major investment of £7.8m in new Remote Applications in Challenging Environments (RACE) at Culham will be taken forward in collaboration with NNL[16].

147. Although there is scope for more collaborative activities between the two bodies, the Authority and NNL are two very different organisations with two very distinct missions. Most of the work done by NNL centres around decommissioning and reducing the cost of nuclear clean-up whilst the Authority work centres around the advancement of fusion science and technology.

Potential costs savings

Admin, Procurement and IT

148. Unlike the Research Councils, HR, procurement, payroll, finance, grants, and IT are all provided in-house at NNL. This indicates that there may be some gains from the merger. The two bodies do however share a Combined Pension Scheme.

Staff

149. NNL currently employs 785 staff[17] (682 employed in the scientific, technical, engineering and facilities capacity and 103 employed in an administrative capacity).

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[12] https://www.gov.uk/government/news/announcement-on-the-national-nuclear-laboratory
[13] http://www.nnl.co.uk/about-us/
[14] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168048/bis-13-627-nuclear-industrial-strategy-the-uks-nuclear-future.pdf
[15] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/168048/bis-13-627-nuclear-industrial-strategy-the-uks-nuclear-future.pdf
[16] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330689/UKAEA_annual_report___accounts_2013-14_-_web_version.pdf
[17] http://www.nnl.co.uk/media/1634/nnl9855_ar_report_web.pdf

The average salary is £45.7k[18] which is higher than the median total remuneration at the Authority.

Budget

150. As a limited company, NNL generates its own revenue. As already stated, the company's principal activity is the provision of technology services across the nuclear fuel cycle. There are three key areas of this cycle: waste management and decommissioning, fuel cycle solutions and reactor operations support. Their revenue (£85.4m in 2014) arises entirely from the sale of services both in the UK and overseas, although their overseas sales make up a small proportion of total revenue.

Other Possible Mergers

151. Other possible bodies for a merger were considered. In doing so the team drew from a recent review into possible mergers that was undertaken by EPSRC. A summary of the findings of this review is included in Table 4 below.

152. The Authority (or any merged entity) should also consider the tactical advantages of forming a GovCo in part (though it should be noted that NNL is already a GovCo).

153. There are risks involved in a possible merger. In this particular case the key risk is a perception that the Authority has been absorbed by a larger entity and the consequent loss of its international reputation and influence. In addition, in any merger there are risks to operations and to staff morale if the merger is not carefully planned and carried out. Damage to staff morale would be especially difficult for an organisation which relies so heavily on its intellectual capital and on a skillset developed over many years. These are described in the NAOs publication The Creation of Ofcom: Wider Lessons for Public Sector Mergers of Regulatory Agencies[19].

154. It is therefore necessary that enough preparatory work is undertaken to ensure that this is done in the correct way so the work of the Authority continues with minimal disruption and that the Authority does not lose the good international reputation it has built up. The importance of detailed planning before undertaking any merger is made in the NAO report. The preparatory work should include a full business case with a detailed impact assessment of the costs and benefits of merger options.

155. There is also a risk that while the JET contract is in operation, the governance structures in place for the JET programme would make a merger much more difficult. Therefore, the possibility of a merger should be explored in both a pre- and post-JET scenario, and the timing of a merger should reflect this consideration. While it may be possible to go forward with a merger before the JET contract comes to an end, the risks involved may outweigh the benefits and so work should be carried out to assess

[18] £35,873,000 / 785 (total wages and salaries / total number of employees). Information found on their 2014 annual report http://www.nnl.co.uk/media/1634/nnl9855_ar_report_web.pdf

[19] http://www.nao.org.uk/wp-content/uploads/2006/07/05061175.pdf

the feasibility of an earlier merger. It is also essential that any merger decreases the amount of bureaucracy within the Authority, rather than increase it.

Lessons learned from previous mergers

156. In 2006, the National Audit Office (NAO) evaluated the merger of the five regulatory bodies that created the Office of Communications (OFCOM)[20]. Based on the lessons derived from the creation of OFCOM, the NAO recommends that for future public sector mergers, **decision makers** should:

- Base the decision to merge on a balanced judgement of whether the projected benefits justify the costs of carrying out the merger.
- Clearly identify and account for the costs of carrying out the merger, including setting a separate budget.
- Carry out targeted due diligence as early as possible by gathering important financial, legal, operational and staffing information about the bodies to be merged. This will assist in identifying issues or risks for integration.
- When the decision to merge is taken, establish a set of relevant measurable benefits to be achieved, and collect baseline data before the merger commences. Measure and monitor progress against these objectives.
- Ensure regular communication with staff and stakeholders (such as businesses or consumer groups), reinforcing the merger rationale, identifying those accountable at each stage, and providing regular updates. This should include setting out what has and has not been decided.
- Avoid a decision-making vacuum by clearly defining those accountable for each phase.
- Appoint senior managers early, especially the Board, Chief Executive, Finance and Human Resources Directors.

157. Leaders carrying out the merger should:

- Identify a realistic start date once leaders are in place. Use specialist programme management support to meet this target if necessary.
- Use targeted consultancy support to assist in filling specific skills gaps, rather than to give overall direction to the merger planning in a leadership vacuum.
- Develop a risk mitigation strategy for the integration of finance and IT, as problems in these areas are inherent in almost all mergers.
- Ensure there is a plan to mitigate the risks of disruption to business as usual and the interests of stakeholders, including a dedicated planning team.

[20] http://www.nao.org.uk/wp-content/uploads/2006/07/05061175.pdf

- Ensure early focus on a remuneration strategy, particularly in regards to pensions, which should be clearly communicated to all relevant parties.
- Establish an explicit programme to overcome the challenge of integrating the cultures of the previous bodies, and monitor progress through surveys. This programme may include the decision to house staff in a new single location.
- Review progress regularly. The merger process continues after the formation of the new organisation and phased integration is necessary. Reviews should include processes, structure and management style.

Table 4 - Analysis of possible bodies for a merger with the Authority

	Status Quo	Go-Science	EPSRC	STFC	BIS	DECC	Universities	GOCO (excluding NNL)	Integration w NNL
Support CCFE in being a competent custodian of the UK's long term interests in fusion	Good – commands high confidence at present bearing in mind funding uncertainties	Good – alignment with science policy, good understanding of long-term programmes	Fair – EPSRC a very satisfactory funding partner, but integration may raise pressure for diversion of funding to other energy technologies	Uncertain – focus on facilities rather than research; but is used to timescales and implications of major facilities	Poor – insufficient understanding of long energy issues	DECC currently sees fusion as a 'research' not an 'energy supply' subject. Likely to shift to Fair as DECC moves to address long term energy mix on requisite timescale	Poor – universities have shorter term focus and strategic management capabilities unsuited to the task	Poor – commercial involvement may raise partner concerns; would require new checks and balances	Uncertain – as f GO-Science, tho expertise base a fission commitm may allay conce
Be conducive to the continuation of JET	Very good – established in the eyes of funders and stakeholders as a good owner	Good – understanding of research collaboration and programmes	Fair – combining funding and ownership of UK programme would not be a major change for EURATOM	Poor – EURATOM may see change as reason to reconsider JET	Poor – EURATOM may see change as reason to reconsider JET	Poor – EURATOM may see change as reason to reconsider JET	Poor – EURATOM may see change as reason to reconsider JET	Poor – EURATOM may see change as reason to reconsider JET	Poor – EURATOM may change as reaso reconsider JET
Be acceptable to key external stakeholders	Good – no major stakeholder concerns highlighted	Good –	Good – close to current EPSRC funding model	Poor – stakeholders would be worried about financial risk	Uncertain – BIS open to cuts as not seen as appreciating long term energy issues	Uncertain – premature until DECC addresses longer terms and acknowledges fusion for energy rather than for research	Poor – uncertainty over finance, risk of diversion to short term goals/REF priorities	Poor – commercial involvement. Would require considerable ShEx attention to manage the bidding/transition process	Uncertain – as for 2 but allay somewhat by fis /fusion synergies and common are of technical interest/manage challenge
Offer a sound and	Fair – recognised for	Fair – no budget of its	Fair – advantage of	Showstopper in short term	Poor – repeated	Poor – repeated	Poor – universities	Poor – especially if this	Uncertain – would require G

	Status Quo	Go-Science	EPSRC	STFC	BIS	DECC	Universities	GOCO (excluding NNL)	Integration w NNL
stable funding climate	neutrality and absence of conflicting agendas	own, but likely to be effective supporter and advocate	owner = funder balanced by risk that fusion appears a large % of EPSRC energy spend and so cuts may be proposed	if STFC takes on funding with its current resources; uncertain at best in medium/long-term	Treasury cuts affect all BIS areas	Treasury cuts likely	facing severe financial stringency	involved re-negotiation of key contracts in Europe	guarantee.
Support the efficient and effective delivery of the research and development programme	Fair – present arrangements widely respected but little input from owner	Uncertain. Not set up to be executive owner of delivery programmes, though excellent understanding of issues and central policy role	Fair – though uncertainty as ESPRC does not operate institutes of its own, and there may be tension between 'grant-giving' and 'delivery' attitudes	Poor – currently focus on facilities rather than on programmes; tension between 'grant-giving' and running an institution	Poor – lack of capacity/capability within Dept	Poor – lack of capacity/capability within Dept	Uncertain – universities' capabilities not well matched to long term delivery; hard to retain/develop specialist staff, hard to build careers for transition to technology focus	Fair – precedents elsewhere satisfactory	Fair – would require crafting of areas overlap and syn and perhaps resurgence of G IV research
Ensure access to the requisite nuclear safety expertise	Fair – track record respected; expertise no longer entirely in-house but CCFE able to be an 'intelligent	Fair – could access links as required	Fair – strong links to expertise in academia and elsewhere	Fair – as for ESPRC	Fair	Fair	Uncertain – safety issues may arise from more open ethos, and cost pressures may constrain use of external expertise?	Uncertain – commercial/cost pressures may deter full and timely use of external expertise	Good – expertise in-hou as in fission; tho NNL is a user, n possessor, of a nuclear operatin site licence

	Status Quo	Go-Science	EPSRC	STFC	BIS	DECC	Universities	GOCO (excluding NNL)	Integration w NNL
	customer', not unduly encumbered by commercial cost –cutting considerations								
Support the identification and exploitation of opportunities for UK business	Good – present arrangements widely respected	Good – deep understanding of the timing of research impact and of subsequent exploitation	Good – strong emphasis on achieving impact from research	Fair – emphasis on impact, but less experienced in research as distinct from large-facility operation	Uncertain – would depend upon which part of BIS held responsibility	Poor – moving to uncertain/fair if or when fusion is viewed as an energy contributor	Uncertain – university capability varies widely	Fair – incentive to benefit business, but would need to manage issues of potential competition with contractor's parents	Fair – incentive to ben business, but wo need to manage issues of potenti competition with contractor's pare
Enable the fusion programme to make a sound contribution to, and draw effectively upon, the UK's science, engineering and technology base	Good – present arrangements widely respected	Good – the profile of GO-S would enable good links	Good – strengthened academic links	Fair – academic links will be strong, but focus on large-facility operation	Fair – matches BIS priorities	Uncertain –	Good – strengthened academic links	Fair – some concern about short term cost pressures inhibiting cooperation e.g. with academia	Good – existing links suggest confide
Support a sound management	Very good – present arrangements	Uncertain – GO-S has little	Fair, though expensive guarantee	Fair, though expensive guarantee	Fair –	Fair –	Uncertain – Govt guarantees on	Uncertain – Govt guarantees on site related	Uncertain – Govt guarantees site related liabil

	Status Quo	Go-Science	EPSRC	STFC	BIS	DECC	Universities	GOCO (excluding NNL)	Integration w NNL
of ancillary issues associated with sites, pensions etc.	widely respected, no complex transition required	experience in properties and pensions management	would still be required (or retention of liabilities by Govt e.g. via secondment rather than transfer of staff)	would still be required (or retention of liabilities by Govt e.g. via secondment rather than transfer of staff)			site related liabilities, TUPE etc. would be required and would be costly	liabilities, TUPE etc. would be required and would be costly	TUPE etc. would required and wo be costly

Summary of Considerations

Triennial review team conclusions on Phase 1

158. We conclude that:

- The functions of the Authority are necessary and that the Authority meets the Cabinet Office test that this a technical function which needs external expertise to deliver.

- There are potential benefits for the Authority to merge with another relevant science body. Therefore, the Authority should commence work now to determine what the best option should be and assess the viability of such a merger, with a view to implementation from 2018. This should be considered in line with the Authority's plans for its post-JET future, but with consideration of possibly doing this ahead of the end of the JET contract if the benefits of an earlier merger outweigh the risks. There are two possible candidates which would be the NNL, which could create a larger national laboratory with a higher international profile, and with expertise in both fission and fusion technology. It (or any merged entity) should also consider the tactical advantages of forming a GovCo in whole or in part (though it should be noted that NNL is already a GovCo) or the STFC, which would offer clear synergies around the management of the Harwell and Culham sites and addressing some of the engineering challenges inherent in the development of nuclear energy over the next two decades.

- Until then, the Authority should continue to operate as an NDPB until JET comes to an end, though work should also be undertaken to identify if a successful merger can be achieved while JET remains in operation. The Authority should commence work now to determine what the best option for a merger would be and assess the viability of such a merger, with a view to implementation from 2018.

- Its subsidiary functions of ensuring the maximum benefit to the UK from ITER and other international collaborations, and of developing scientists and engineers with skills suited to nuclear research, also meet these criteria, and we recommend that the Authority continue to deliver them under its existing model.

- The Authority should seek to deliver the property management elements of its Culham Science Centre via some form of public and private partnership, as it does at Harwell. This model would allow the Authority to continue to support innovation in UK industry and to make the most of the intellectual property it has developed, while bringing in private sector skills and investment to the development and management of the site at Culham.

- The Authority should continue to develop and grow the apprenticeship programme with a view to offering training to other organisations. The skills that

are being developed have a clear benefit to the UK economy and the UK's aim to expand fission and fusion in the future.

- Phase 2 of this Review should proceed, and should focus on two key areas:
  - With respect to governance, we will focus on the strategic direction of nuclear science in the UK, and on opportunities to create more streamlined governance around this.
  - With respect to efficiency, we will focus on opportunities to streamline the Authority's internal processes, where stakeholders perceive considerable opportunities to improve staff retention, morale, and interactions with the local community and tenants at the Authority's two sites.

Table 5 – Analysis of Review Framework

Review framework	Theme 1: Policy & Regulation	Theme 2: Science	Theme 3: Economic/ Innovation System	Is this supported by the current business model?	Can other actors undertake this role?	What are the constraints on which other actors could perform this role and are there benefits?
Does the PSRE play a unique role in this area?	No, except as a residual function	Yes; the authority has an international reputation in both fusion and some aspects of fission and a unique skillset for driving forward nuclear science within the UK.	Yes; as a key part of the Science triangle between London, Cambridge and Oxford, as a unique pool of extremely valuable skills and source of new talent for UK nuclear engineering; and as a holder of some key intellectual property for the UK.	Yes, for the most part.	No	Yes; the expertise at the Authority, which brings together cutting-edge science, design engineering, and major project management; and the access to the Tokamaks.
Does the PSRE have distinctive expertise?	No	Yes; see above	Yes; UKAEA also has distinctive expertise in Materials engineering and robotics which	Yes; and indeed the uniqueness of the expertise and engagement available at the Authority is very	No	Yes; see above

Review framework	Theme 1: Policy & Regulation	Theme 2: Science	Theme 3: Economic/ Innovation System	Is this supported by the current business model?	Can other actors undertake this role?	What are the constraints on which other actors could perform this role and are there benefits?
			have economic spin offs in the UK economy; its technical engagement with the small to medium enterprises which are located alongside it is recognised by stakeholders as driving innovation extremely effectively and contributing to both the local and the national economy.	much a function of its historical development as a PSRE.		
Does the PSRE play a specific government /statutory function?	It retains some liabilities incurred by its predecessor bodies.	No, though it plays a major part in setting the direction for the UK's nuclear	No	n/a	n/a	With respect to the liabilities, the Authority has the relevant institutional memory to handle

Review framework	Theme 1: Policy & Regulation	Theme 2: Science	Theme 3: Economic/ Innovation System	Is this supported by the current business model?	Can other actors undertake this role?	What are the constraints on which other actors could perform this role and are there benefits?
		research.				them efficiently.
Does the PSRE have a cross government function?	UKAEA feeds into the policy of both DECC and BIS	Authority staff sit on a number of cross-Whitehall and European scientific advisory boards.	No	Yes	No	The authority's expertise and international reputation, as noted above.
Does the PSRE have an international function?	UKAEA (CCFE) is a major site for fusion research in Europe, including hosting the world's largest fusion research facility, JET. It receives EU and international funding for JET. And feeds into the EU policy strategy on Fusion. UKAEA is a key part of the EU Fusion network.		UKAEA leverages the UK's funding extremely effectively via its European contracts.	Yes	No	The expertise at the Authority, which brings together cutting-edge science, design engineering, and major project management; and the access to the Tokamaks.
Does the PSRE have the potential to commercialise this role?	No	Not for the foreseeable future.	Yes, in part. There is potential to commercialise the purely property-related elements of the	Yes	No	See above

Review framework	Theme 1: Policy & Regulation	Theme 2: Science	Theme 3: Economic/ Innovation System	Is this supported by the current business model?	Can other actors undertake this role?	What are the constraints on which other actors could perform this role and are there benefits?
			Authority's activities, but its IP and innovation contributions are highly unlikely to be commercialisable at present.			
Does the PSRE support businesses on innovation and growth?	Yes	Yes. Spin offs from work on Fusion are applicable to business, and the Authority is working very effectively to develop those spin-offs and engage with industry around them.	Yes – UKAEA has two science parks, one of which is run as a joint venture with the private sector. It provides a very attractive offer of technical support and facilities to its tenants, many of which work in technical industries and tell us that they have benefited greatly from the	Yes	Yes	There is some potential to engage with the private sector at the Culham site.

Review framework	Theme 1: Policy & Regulation	Theme 2: Science	Theme 3: Economic/ Innovation System	Is this supported by the current business model?	Can other actors undertake this role?	What are the constraints on which other actors could perform this role and are there benefits?
			Authority's technical support.			

Stage Two: Governance and Efficiency

Introduction

1. This section follows on from Stage One of the Triennial Reviews of the UK Atomic Energy Authority (the Authority). In Stage One, the Triennial Review team recommends that the Authority investigates the possibility of a much closer alignment or merger with the STFC and NNL, but that it continues to operate in its current form until this work has been carried out. This section sets out the findings of Stage 2 of the Review and examines the Authority in its present form.

2. The second stage of the Review considers how far the Authority's practice aligns with principles of good governance. The assessment is summarised below, and set out in detail in Table 6 at the end of this document.

Compliance with principles of good governance

3. The Authority provided comprehensive supporting documentation for its questionnaire response, including policies available to the public on its website and internal documents where relevant to governance and accountability issues. The Authority's Governance and Accountability arrangements are also set out in the United Kingdom Atomic Energy Authority Framework Document (February 2014).

Accountability

Statutory Accountability

4. The Authority complies with all the relevant statutory and regulatory requirements, as well as best practice. Many of the policies which apply in this area, such as the publication scheme and information on making freedom of information or data protection requests, are available on the GOV.UK website.

5. On action planned, the Authority has stated that a regular means of reviewing the website and the information it contains should be established to ensure all public information is up to date.

Accountability for Public Money

6. The Authority complies with all the relevant requirements including the Accounting Officer role and complying with Managing Public Money. The Authority has guidance for staff on financial issues including expenses, gifts and hospitality, and fraud policies. The Annual Report and Accounts for 2013-14 were published on 15 July 2014. The Authority also improved the financial delegation process this year.

7. On actions planned, the Authority has stated that it is reviewing improvement to the delegation process following revisions in 2013-14 to ensure the new process is fully embedded and fit for purpose.

Ministerial Accountability

8. The Authority complies with the majority of requirements in this area. However, the Secretary of State has not met regularly with the Authority's Chair and Chief Executive as outlined in BIS guidance. There are no direct meetings between the Authority and BIS Ministers. However, they do have contact through other meetings such as a regular RCUK CEO meeting with the former Minister David Willetts, the Advanced Materials Leadership Council chaired by Greg Clark and the Prime Minister's Council for Science and Technology.

9. Despite this, the Authority explained that they feel they have sufficient Ministerial engagement, particularly given the good working relationship between the Authority and the BIS sponsor team. The Authority has said that it will consider with the BIS Sponsor Team whether regular meetings with the Secretary of State should be held in the future.

10. **Recommendation 1: The Authority and BIS should consider the need to hold regular meetings between BIS Ministers and the Authority to ensure BIS Ministers are sufficiently well informed about the Authority's activities.**

Roles and Responsibilities

11. The Framework Document sets out the roles and responsibilities for the Authority and BIS. This document is due to be reviewed to take account of any issues arising from this Triennial Review.

Sponsoring Group

12. The Authority complies with the relevant requirements with significant interaction between the sponsor team and the Authority. This includes regular meetings that are held between the Authority and the sponsor team, 6-monthly meetings between the CEO, CFO and BIS directors to update on progress against the Corporate Plan, a BIS Director attends the Authority Board meetings and the sponsor team provides input into the corporate plan.

Role of the Board

13. The Triennial Review team found that the Authority Board complies with the relevant requirements. However, it notes that the current Board is 0% Female with 0% Black and Minority Ethnic (BME) membership. This is in comparison to approximately 20% female staff within the Authority. The Authority is working towards Athena Swan recognition and to improve diversity among its staff. The Authority has also said that increasing the gender make-up of the Board will be a priority for the next round of Board Member recruitment.

14. The Triennial Review team also found that although the Authority Board evaluates its own collective performance, the evaluation of Board members' individual performance is not done systematically. The Authority has stated that it will consider how performance reviews of the individual Board members could be carried more systematically and put appropriate arrangements in place.

15. **Recommendation 2: The Authority should look to address the diversity of its Board and it should create a Board Diversity Policy to address this issue.**

16. **Recommendation 3: The Authority, in its revised framework document, should set out how individual board members' performances will be appraised.**

Role of the Chair

17. The Authority's board is led by Professor Roger Cashmore CMG, FRS as a lay member and non-executive Chair. The Authority complies with the Principles of Good Governance in relation to the appointment of the Chair and setting out the Chair's role and responsibilities. Much of this is set out in the Framework Agreement with BIS.

Role of the Chief Executive Officer (CEO)

18. The Authority is led by Professor Steve Cowley FRS, as the CEO and Accounting Officer. The Authority has a formal, rigorous and transparent process for the appointment of the CEO. There is reference to this in the Framework Agreement with BIS. The Authority followed a slightly different process – which was also appropriately rigorous and transparent - in appointing Steve Cowley to the post in 2009 following a restructuring of the organisation, as he was already in post as Director of the Culham Centre for Fusion Energy.

Role of the Non-Executive Board Members

19. The Authority's board has a non-executive and lay member majority. Responsibilities of the non-executive board members are set out in the Framework Agreement, and the Authority clearly sets out these roles and responsibilities in appointment letters for board members. Board members also undergo an induction process and bespoke training carried out by the National Audit Office. The Board also appraises itself as a collective annually but has not hitherto engaged in systematic evaluation of individual members. However, the Authority has now committed to developing an appraisal process for individual Board members.

Effective Financial Management

20. The Authority complies with the Principles of Good Governance on effective financial management, for example by publishing timely annual reports, undertaking appropriate financial risk management and having financial management systems in place, such as internal controls and comprehensive financial regulations.

21. However, a bid from the Authority to receive 'invest to save' funding highlighted an overspend which arose as a result of issues with project management on the MAST upgrade project. The Authority was able to reduce the majority of the overspend with assistance from EPSRC, and is conducting a review with external help of the project. As a result, the Triennial Review team feel that stronger project management and project budgetary controls may be needed to mitigate against risks of future overspends.

22. There is a separate issue for the JET operations contract due to fluctuations in the Euro exchange rate. This year it has meant that funding granted in Euros at the

beginning of a financial year, but allocated at a later date, with a declining exchange rate, has meant less funding, in Pounds, being available.

23. The Authority's internal audit function is carried out by the Authority's own Internal Audit function operating in accordance with the relevant internal audit standards. They also use the RCUK Shared Audit function when extra help is required. The National Audit Office (NAO) provide audit of the Authority's Annual Report and Accounts. A log of prospective gifts and hospitality, whether accepted or not, is maintained and available on request. This is not published online.

24. **Recommendation 4: The Authority should strengthen its Project Management and Project Budgetary controls, implement the findings of the external review of the MAST Upgrade project and conduct an internal audit of its Project Management processes.**

25. **Recommendation 5: BIS should work with the Authority to establish how other establishments which receive funding in Euros but are billed in Sterling handle this variation and the associated risk, and explore whether it is possible to manage the risk collectively across Whitehall – perhaps via an arrangement with HMT.**

Communication and Engagement

26. The Review team found that the Authority complies with most of the requirements in this section. However, the Authority does not hold open board meetings. It explains that this is due to the commercial and personal sensitive nature of discussions held. The board publishes redacted board minutes and the majority of board papers as well as being fully open on fusion research, with open evenings, tours, and outreach to schools and colleges. The Authority has said that it will keep the issue of open board meetings under review.

27. The Authority publishes information regularly under a publication scheme and consults extensively on its policy areas. The complaints handling procedure is published on the GOV.UK website at: https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/complaints-procedure.

28. The Authority publishes spend data and credit card expenditure as specified in the Governments Transparency Guidelines [https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/publication-scheme].

29. **Recommendation 6: The Authority should look to increase the level of openness and transparency of Board meetings by holding some board meetings openly, with commercial and personal sensitive discussion items remaining closed. The Authority should consider how this can be done with minimal bureaucracy as part of its planned Board review.**

Conduct and Behaviour

30. The Review team found that the Authority complies with most of the requirements in this section. A code of conduct is included in the Authority's Conditions of Employment Manual and Board members' interests are published on the website and in the annual report and accounts. Rules and guidelines for managing conflicts of interest are included in the Authority's Conditions of Employment Manual and the annual review of the Board's performance includes an assessment and confirmation that Board members are operating to the 7 principles of public life.

31. The framework document agreed between the Authority and BIS confirms that the Authority will comply with all relevant government policies and guidance, including the Cabinet Office 'Code of Conduct for Board Members of Public Bodies' which stipulates a number of rules around political appointments during and after Authority appointment. Political Activity is also actively discouraged through reminders at election time. However, the Authority does not currently have a formal procedure in place to ensure this. The Authority has said it will consider how to best ensure that these rules are complied with.

32. **Recommendation 7: The Authority should review its procedures for ensuring board and staff compliance with rules on political activity and acceptance of appointments or employment after resignation or retirement, and should ensure that appropriate procedures are put in place.**

Process Efficiency

33. Stage 1 of the report recommended that the report should look at opportunities to improve staff retention, morale and interaction with the local community and tenants at the Authority's two sites.

34. The Triennial Review team found that one of the factors causing difficulty with staff retention was overly bureaucratic processes within the Authority. Over the last five years, the Authority has taken helpful steps to streamline and systematise internal processes – in particular by introducing of a new Work Control System and a Point of Work Risk Assessment. These changes have led to significant reductions in time and cost spent on internal processes, whilst accident/incident frequencies have remained stable.

35. A report undertaken by the Authority found that as a result of these systems:

    - Users of the current Work Control system now spend 8% of their time on Work Control compared with 14% in 2009 which represents a significant improvement in efficiency.
    - 59% of users thought bureaucracy within safety systems had reduced.
    - 72% felt the current Work Control system was effective up from 36% in 2009.

36. The Authority has a Management Systems Group, which focuses on process improvement as well as ensuring that the Authority maintains its excellent record on safety and control. The Review Team spoke to a representative from the Group and were impressed by their enthusiasm for process improvement.

37. Nevertheless, the major improvements referred to above took place some time ago, and the focus has shifted somewhat towards achieving improvements by ensuring consistency of process rather than bottom up process review. There is more that could be done in this area which the team are enthusiastic about, such as ensuring management systems and health and safety requirements take a more risk-based approach. The Authority is currently developing a strategic Assurance plan. This should include a strategic approach to improving its processes and systems, so as to focus on the highest impact areas, consideration of resourcing devoted to process improvement, and developing KPIs for the team which measure process improvement as well as safety and control.

38. The Authority has made considerable progress against the Digital by Default agenda. In particular, most of its internal processes are managed using digital systems and it continues to seek opportunities to improve process management through the use of technology. The Authority website has recently moved to GOV.UK and this will allow it to improve outreach and transparency by making its publications, board minutes and other information more readily accessible to a wider audience.

39. **Recommendation 8: The Authority should accelerate the development of its Assurance strategy – including consideration of resourcing - and KPIs for process improvement, and should continue work on risk-based approaches as well as consistency of process, building on its previous good work.**

Energy costs and environmental considerations

40. The Triennial Review team also examined the Authority's energy efficiency, including its energy strategy and supply contracts and its energy efficiency plans. Overall, the Triennial Review team found that the contracts that the Authority has in place are good value for money. There are 4 contracts:

    - Culham West site 132kV HH supply, which covers tenanted and office buildings, is supplied under the Crown Commercial Framework with EDF Energy, UK funded mandated route.

    - Culham West Site 132kV NHH supply again which covers tenanted buildings is supplied under the Crown Commercial Framework with British Gas, UK funded mandated route.

    - 400kV Pulsed Power Supply for the JET Experiment. This supply is taken straight off the National Grid, and is European funded which means that some procurement processes are EU mandated. Tender action is undertaken on an annual basis (normally in October each year) for provision of this supply for the following calendar year (via a Framework which is compliant with EU regulations). This supply currently has a zero tolerance which is essential as this allows for considerable flexibility with respect to JET operations and shutdown; there may be unforeseen circumstances where the Authority plans to operate and take pulsed power but fail to do so, or manages more pulses than planned, and it is important that the supplier bears the risk of these variations. Contracts are only entered into for a maximum of 12 months, to minimise the risk posed by changes to the programme. Current rates are 7.9364 p/unit day, 6.4692 p/unit

night. Because of the specialist nature of this supply, the number of interested suppliers is quite limited, and the Authority seeks additional assurance of VFM by taking advice from an independent energy broker.

- Culham East 132kV HH supply (supports the JET Experimental facility- covers the supply to ancillary equipment). This is European funded. Tender action is undertaken on an annual basis (via a Framework which is compliant with EU Regulations). The supply contract operates on a fiscal year, and tenders are normally issued early February for a 1st April start. The current contract has a 20% tolerance threshold, as demand for this supply has more consistency than that for the 400kV pulse supply and the Authority can tolerate some risk. Again the Authority only commits to 12 months at a time in case of changes to Work Programme or breakdown of supporting plant and equipment (which is some 30 years old) so the risk is greater year on year. Current rates are 5.831 p/unit day, 4.270 p/unit night.

41. On both its non-CCS energy contracts, the Authority has achieved reductions in its rates this year.

42. The Authority has a post dedicated to achieving environmental improvements, in particular through energy efficiency and reduced emission of greenhouse gases.

43. By fitting variable speed drives to cooling towers the Authority has reduced its demand for non-pulsed energy and the Authority has also managed to reduce energy consumption through making improvements to lighting and ensuring lights and computers are switched off. The Authority has also reduced its paper consumption by half by removing single printers on desks and introducing large multifunctional printers which default to double-sided – though it has seen an increase in unit costs of paper as a result of increased consumption of A3 paper.

44. It has also made very considerable reductions in its greenhouse gas emissions by changing the insulating gases it uses. This is expected to reduce the site carbon footprint by approximately 50% through replacement of SF6 to nitrogen, which also results in a cost saving due to the purchase price of the gases.

45. Finally, it has reduced its water consumption by covering its waste tanks to reduce growth of algae and using effluent to dilute activated water.

46. The Authority's excellent progress in this area so far has been largely driven by investment in projects with relatively low costs and short pay-back periods; as it turns its focus towards more major investments it will need to develop a more systematic approach to prioritisation within its energy strategy. Some such projects may require additional funding from Government.

47. **Recommendation 9: The Authority should further develop its environmental impact and energy efficiency strategy to enable it to assess the VFM of more major projects with longer payback periods and to prioritise these effectively, subject to available funding**.

Nuclear Governance

48. Stage 1 of this review also recommended that this review should consider opportunities to create a more streamlined governance structure for nuclear science in the UK. Some of this complexity is a necessary function of combining UK and EU governance, but some derives from the large number of interested bodies within the UK. The Review Team therefore recommends this point be reconsidered alongside the post-JET future of the Authority and the mergers suggested in Phase 1.

49. **Recommendation 10: When the EPSRC has published their fusion strategy the Authority should update their existing strategy, linking it clearly to the EPSRC's.**

Conclusion and Recommendations

50. The Stage 2 assessment has found that the Authority governance largely complies with Cabinet Office's principles of corporate governance. In some instances where it does not, the Authority has either explained the reasons for this or have committed to reviewing their rules and processes to ensure good corporate governance.

51. The Review has also identified several opportunities to make improvements, to help BIS make the best use of the Authority, the sponsor team and wider government.

Summary of Stage 2 recommendations

Recommendation 1: The Authority and BIS should consider the need to hold regular meetings between BIS Ministers and the Authority to ensure BIS Ministers are sufficiently well informed about the Authority's activities.

Recommendation 2: The Authority should look to address the diversity of its Board and it should create a Board Diversity Policy to address this issue.

Recommendation 3: The Authority, in its revised framework document, should set out how individual board members' performances will be appraised.

Recommendation 4: The Authority should strengthen its Project Management and Project budgetary controls, implement the findings of the planned external review of the MAST Upgrade project and conduct an internal audit of its Project Management processes.

Recommendation 5: BIS should work with the Authority to establish how other establishments which receive funding in Euros but are billed in sterling handle this variation and the associated risk, and explore whether it is possible to manage the risk collectively across Whitehall – perhaps via an arrangement with HMT.

Recommendation 6: The Authority should look to increase the level of openness and transparency of Board meetings by holding some board meetings openly, with commercial and personal sensitive discussion items remaining closed. The Authority should consider how this can be done with minimal bureaucracy as part of its planned Board review.

Recommendation 7: The Authority should review its procedures for ensuring board and staff compliance with rules on political activity and acceptance of appointments or employment after resignation or retirement, and should ensure that appropriate procedures are put in place

Recommendation 8: The Authority should accelerate the development of its Assurance strategy – including consideration of resourcing - and KPIs for process improvement, and should continue work on risk-based approaches as well as consistency of process, building on its previous good work.

Recommendation 9: The Authority should further develop its environmental impact and energy efficiency strategy to enable it to assess the VFM of more major projects with longer payback periods and to prioritise these effectively, subject to available funding.

Recommendation 10: When the EPSRC has published their fusion strategy the Authority should update their existing strategy, linking it clearly to the EPSRC's.

Table 6: Assessment against principles of good governance

Principles of good corporate governance	Assessment	Comments
Accountability		
Statutory Accountability: The public body complies with all statutory and administrative requirements on the use of public funds (inc. HMT Managing Public Money, and CO/HMT spending controls)	Comply	The Authority was set up by 1954 Atomic Energy Authority Act and subsequent revisions. It has a published Framework Document agreed with BIS setting out responsibilities. See https://www.gov.uk/government/publications/framework-document. The Board and Executive have ToR laying out responsibilities.
The public body operates within the limits of its statutory authority and in accordance with delegated authorities agreed with BIS	Comply	The Board and Chief Executive ToR are based on statutory authority (1954 Act) and agreement of Framework document with BIS. Board members are appointed by BIS. There is a Delegation letter from BIS each year (latest version 14/1/14) outlining delegated authorities.
The public body operates in line with statutory requirements for the Freedom of Information Act	Comply	The Authority has an FOI procedure (CD/P/G04) and officer. The web page gives public information. FOI request logs and requests of public interest are published on the GOV.UK website. See https://www.gov.uk/government/organisations/uk-atomic-energy-authority
The public body has a comprehensive publication scheme	Comply	The Authority has a comprehensive Publication Scheme outlined on GOV.UK website See https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/publication-scheme
The public body proactively releases information that is of legitimate public interest	Comply	This data is published on the GOV.UK website: https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/publication-scheme and on data.gov dedicated page: http://data.gov.uk/publisher/united-kingdom-atomic-energy-authority.

Principles of good corporate governance	Assessment	Comments
		In addition, some transparency data (e.g. workforce management information) is published by BIS for all partner organisations.
The public body Produces Annual Reports and Accounts which are laid before Parliament	Comply	The Authority's Annual Reports and Accounts are published and laid before Parliament every year. The Authority's Annual report and Accounts for 2013/14 is published on GOV.UK: https://www.gov.uk/government/publications/ukaea-annual-report-and-accounts-201314
The public body applies with data protection legislation	Comply	The Authority has an internal Data Protection procedure (CD/P/G04) and public information charter: https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/personal-information-charter
The public body complies with Public Records Acts 1958 and 1967	Comply	The Authority has a Records Officer, and complies with record retention policies. It submits records to the National Archive.
Accountability for public money: there is a formally designated Accounting Officer (AO) who in particular has a responsibility to provide evidence-based assurances required by the Principal Accounting Officer (PAO)	Comply	Steve Cowley has been appointed as AO by the BIS Permanent Secretary.
The role, responsibilities and accountability of the AO should be clearly defined and understood and the AO should have received appropriate training.	Comply	The letter of appointment lays out the responsibilities of Steve Cowley as AO. BIS delegation letters confirm these each year. Steve Cowley attended training on the responsibilities of an Accounting Officer by the National School of Government.
The public body should be compliant with requirements set out in Managing Public Money, relevant Dear Accounting Officer letters and other directions.	Comply	The Framework document lays out the responsibilities of the Authority, Board and CEO in complying with Managing Public Money, relevant Dear Accounting Officer letters and other directions. It is worth noting that the Authority is funded approx. 2/3 by the European Commission, who lay down their own

Principles of good corporate governance	Assessment	Comments
		contractual and audit requirements, to which the Authority is fully compliant.
The public body should establish appropriate arrangements to ensure that public funds: • are properly safeguarded; • are used economically, efficiently and effectively; • are used in accordance with the statutory or other authorities that govern their use; • deliver value for money for the Exchequer as a whole; • are subject to Treasury approval, either directly or through established delegated authority	Comply	The Board and Chief Executive Terms of Reference, together with the Framework Document lay out how the Authority meets these requirements. Internal Finance Manual and delegation letters set out how the day to day operation complies. These have been recently reviewed and updated.
The annual accounts are laid before Parliament after certification by the Comptroller and Auditor General.	Comply	Accounts have been produced and laid before Parliament since 1954. They are certified by the NAO. The more recent versions are available on the GOV.UK website, the 2013/14 version is: https://www.gov.uk/government/publications/ukaea-annual-report-and-accounts-201314
Ministerial Accountability: The Secretary of State and Sponsor should exercise appropriate scrutiny and oversight of the public body.	Comply	The 1954 Atomic Energy Authority Act lays out the responsibilities of the SoS. These are confirmed in the Framework Document. Day to day oversight of the Authority is delegated by the SoS to the BIS sponsor team (see Role of the Sponsoring Group for details).
Appointments to the board should be made in line with any statutory requirements and, where appropriate, with the *Code of Practice* issued by OCPA.	Comply	Appointments to the Board are made by the Secretary of State, following the OCPA code.
The Secretary of State will normally appoint the Chair and all non-executive board members of the public body and be able to remove individuals whose performance or conduct is	Comply	The SoS lays out the terms of appointment for Board members in their appointment letter, and would be able to remove individuals whose performance or conduct is

Principles of good corporate governance	Assessment	Comments
unsatisfactory.		unsatisfactory.
The Secretary of State should be consulted on the appointment of the Chief Executive and will normally approve the terms and conditions of employment.	Comply	The Authority Board is responsible for the appointment of the CEO, but this is done after consultation with BIS and the Secretary of State. BIS are consulted and approve the terms and conditions of appointment. The CEO is also the Accounting Officer, which is a BIS appointment.
The Secretary of State should meet the Chair and/or Chief Executive on a regular basis.	Explain	Regular meetings between the Secretary of State and the Chair/CEO have not taken place over the last few years. However, the Chair/CEO do have regular meetings with senior BIS officials, who report up to the relevant Minister/SoS as required. Both the Chair and CEO are members of senior government committees (such as the CST, Advanced materials, NIRAB etc.), which gives an opportunity for the Authority to express its views.
Parliament should be informed of the activities of the public body through publication of an annual report.	Comply	The Annual Report and Accounts is laid before Parliament each year.
A range of appropriate controls and safeguards should be in place to ensure that the Secretary of State is consulted on key issues and can be properly held to account (e.g. Business Plan, power to require information, a general or specific power of Ministerial direction over the public body, a power for the Secretary of State to be consulted on key financial decisions.)	Comply	The BIS sponsoring team take on the role of reviewing the Corporate Plan each year, and ensure that the SoS is consulted on any issues that are relevant to the SoS. See Role of the Sponsoring Group for details. The European Commission lays out (through the EUROfusion consortium) the long term roadmap for European fusion research. CCFE is an integral part of this roadmap, and helps to formulate both UK and EU policy.

Principles of good corporate governance	Assessment	Comments
Roles and Responsibilities		
Role of the Sponsoring Group: The Group should scrutinise the performance of the public body. There should be appropriate systems and processes to ensure effective governance, risk management and internal control in the public body.	Comply	Monthly meetings are held between the sponsor team and the CFO to discuss on-going issues. 6-monthly meetings are held between the CEO, CFO and BIS directors to update on progress against the Corporate Plan. A yearly risk-review meeting is held, chaired by the BIS Director General for Finance and Commercial, to review the current risk status of the Authority. A BIS director attends the Authority Board meetings. The Corporate Plan is reviewed by the sponsor team. The Authority provides monthly input to the BIS EPM system on financial performance, together with a large number of other transparency and other requests for information from BIS and Cabinet Office.
There should be a Framework Document in place which sets out clearly the aims, objectives and functions of the public body and the respective roles and responsibilities of the Secretary of State, the Sponsoring Group and the public body. It should be regularly reviewed and updated and follow relevant CO and HMT guidance. The Framework document should include a Financial Memorandum as an appendix. A review of the Framework document should be carried out every three years and in line with the Triennial Review.	Comply	The current Framework Document was agreed in March 2014. The Authority has a financial manual which includes items such as the delegation matrix. BIS update the delegation letter regularly (last letter was January 2014).
A Sponsor should be identified and there should be regular and on-going dialogue between the Sponsoring Group and the	Comply	Monthly meetings are held between the sponsor team and the CFO to discuss on-going issues.

Principles of good corporate governance	Assessment	Comments
public body. Senior officials from the Sponsoring Group may as appropriate attend board and/or committee meetings.		6-monthly meetings are held between the CEO, CFO and BIS directors to update on progress against the Corporate Plan. A yearly risk-review meeting is held, chaired by the BIS Director General for Finance and Commercial, to review the current risk status of the Authority. A BIS director attends the Authority Board meetings. The Corporate Plan is reviewed by the sponsor team. The Authority provides monthly input to the BIS EPM system on financial performance, together with a large number of other transparency and other requests for information from BIS and Cabinet Office.
Role of the Board: The Board of the public body should meet regularly, retain effective control over the PO, and monitor the SMT, holding the CEO accountable for the performance and management of the PO.	Comply	The Board meets around 5-6 times per year, with additional meetings to discuss strategy. The Board receives an update at each meeting from the CEO (including assurance), a finance report and other updates as required. BIS attend the Board as observers. The duties of the Board are laid out in the 1954 Atomic Energy Authority Act and the Framework Document agreed with BIS. There are three sub-committees – Audit, Assurance and Remuneration. The Annual report and accounts lay out the governance arrangements.
The Board of the public body should be appropriate in size with membership from a diverse background.	Comply	The Board membership was recently reviewed by BIS and now contains the Chair, one Executive member and three non-execs. These include membership covering scientific,

Principles of good corporate governance	Assessment	Comments
		commercial and financial experts. The Company Secretary, who is also the CFO, together with the two additional Executive directors also attend.
The Board of the public body should establish a framework of strategic control specifying what matters are reserved for the board and establish arrangements to ensure it has access to relevant information, advice and recourses to carry out its role effectively.	Comply	The ToR of the Board, together with the Framework document agreed with BIS lay out the matters reserved for the Board. The agenda for Board meetings includes a regular updates from the CEO plus a financial report, together with other issues as required.
The Board of the public body should establish formal procedural and financial regulations to govern the conduct of its business.	Comply	These are covered by the ToR of the Board and sub-committees. These are reviewed annually to ensure they are kept relevant.
The Board of the public body should make a senior executive responsible for ensuring appropriate advice is given on financial matters, procedures are followed, and that all applicable statutes and regulations and other relevant statements of best practice are complied with.	Comply	The CFO is invited to attend each Board meeting, and presents a financial report covering execution of the programme. The Board approve the annual budget at their Feb/March meeting. The CFO is also Company Secretary, and is responsible for ensuring compliance with all relevant regulations.
The Board of the public body should establish a remuneration committee to make recommendations on the remuneration of top executives. Information on senior salaries should be published and rules for recruitment and management of staff provide for appointment and advancement on merit.	Comply	The Remuneration Committee makes recommendations on the remuneration and performance measures of the directors, which are passed to BIS for approval. It is also responsible for ensuring that performance is monitored. The Annual Report and Accounts contains details of the remuneration of all directors.
The Board of the public body should evaluate annually,	Comply	The Board carries out an annual evaluation of its performance

Principles of good corporate governance	Assessment	Comments
including an evaluation of the chair and board members.		and that of its sub-committees, and consider the results of the reviews at one of the Board meetings. The reviews include assessment of the members. The Remuneration Committee carry out a detailed and robust annual evaluation of the Executive Directors performance.
Role of the Chair: The Board should be led by a non-executive Chair, whose duties, roles and responsibilities, terms of office and remuneration should be set out clearly and formally defined in writing. Terms and conditions must be in line with CO guidance and any statutory requirement.	Comply	The Chair is appointed as laid out in the 1954 Atomic Energy Authority Act. The appointment is made by the SoS under the terms outlined by the letter of appointment, and the Framework Document.
There should be a formal, rigorous and transparent process for the appointment of the Chair, which is compliant with the Code of Practice issued by OCPA. The Chair should have a role in the appointment of non-executives.	Comply	The appointment by the SoS of BIS is made under the code of practice issues by OCPA. BIS include the Chair in discussions when appointing new directors.
The responsibilities of the Chair can include: • representing the public body in discussions with the Secretary of State • advising the Sponsor Group/the Secretary of State about board appointments and performance of non-executive members • ensuring non-executives understand their responsibilities; are trained appropriately and undergo annual assessments. • ensure the board takes account of guidance provided by the Secretary of State; carries out its business efficiently and effectively, has its views represented to the public. • develops effective working relationships with the CEO (role	Comply	The role and responsibilities are set out in the Framework Document, section 7, together with the Terms of Reference of the Board. In April 2013, the Chairman wrote to BIS advising of reappointment of the non-executive directors, including an assessment of the individual members.

Principles of good corporate governance	Assessment	Comments
of Chair and CEO must be held by different individuals.) • subject to an annual appraisal by the Permanent Secretary or relevant Director General • appraises other board members ensuring they are performing to standard, following disciplinary procedures if necessary and ensuring they are committing the appropriate time to the work.		
Role of the Chief Executive Officer (CEO): the PO should be led by a CEO, whose duties, roles and responsibilities, terms of office and remuneration should be set out clearly and formally defined in writing. Terms and conditions must be in line with CO guidance and any statutory requirement.	Comply	The CEO is appointed by the Board following consultation with BIS. The CEO is also the Accounting Officer, which is a BIS appointment. The BIS letter of appointment and Framework Document lay out the terms of the appointment.
There should be a formal, rigorous and transparent process for the appointment of the CEO.	Comply	The appointment of Steve Cowley as CEO was made following the restructuring of the Authority in 2009, so was a slightly different process than would normally be the case as he was already in post as Director of Culham. Future appointments will follow BIS advice.
The responsibilities of the CEO can include the responsibilities of the Accounting Officer, the Consolidation Officer and Principal Officer for Ombudsman which involve: • Overall responsibility for the PO's performance, accounting for any disbursements of grant to the PO. • establish the PO's corporate and business plans and departmental targets. • inform the Ministry of Justice of any complaints about the PO accepted by the Ombudsman for investigation if applicable. • management of senior staff within the PO ensuring they are meeting objectives and following disciplinary procedures if	Comply	The responsibilities of the CEO and AO, both to BIS and to the Board, are laid out in the appointment letter and Framework Document section 6, together with the ToR of the Board and Executive Committee.

Principles of good corporate governance	Assessment	Comments
necessary • maintains accounting records that provide the necessary information for the consolidation if applicable. • (details of accounting officer covered under 10: Effective Financial Management.)		
Role of the Non-Executive Board Members: Non-executive members should form the majority of the board.	Comply	The Board consists of the Chair, one Executive member, and three non-Executive members.
Non-executive members should be appointed under a formal, rigorous and transparent process compliant with the code of practice issued by OCPA.	Comply	Non-Executive Directors are appointed by BIS following the guidance produced by OCPA.
Non-executive members should have their duties, roles and responsibilities, terms of office and remuneration set out clearly and formally defined in writing. Their terms and conditions must be in line with CO guidance and any statutory requirement.	Comply	Their appointment letter, together with the Terms of Reference of the Board and Framework document lay out the responsibilities and duties.
Non-executive members should be independent of management.	Comply	The non-Executive directors do not have management roles within the Authority.
Non-executive members should allocate sufficient time to the board with details of their attendance published.	Comply	The members attend both Board and sub-committee meetings. The attendance levels are reported in the Annual Report and Accounts.
Non-executive members should undergo proper induction, and appraisals.	Comply	Upon appointment the non-Executive directors were provided with an induction pack and introductory presentations and tours. The National Audit Office provided bespoke training – an introduction to Audit Committees. Members were offered a range of external training. Peter Jones attended the training to support his role as Chair of Audit Committee and Steve McQuillan attended training on being a non-executive director of a non-departmental public body (NDPB) – both courses were provided by the National School of Government.

Principles of good corporate governance	Assessment	Comments
Non-executive members' responsibilities include: • establishing strategic direction of the PO and oversee development and implementation of strategies, plans, priorities and performance/financial targets. • ensuring the PO complies with statutory and administrative requirements on the use of public funds and operates within its statutory and delegated authority. • that high standards of corporate governance are observed.	Comply	The duties of the non-exec members of the Board are outlined in the Framework document section 7, together with the Terms of Reference of the committees they attend.
Effective Financial Management		
Publish on time an objective, balanced and understandable annual report which complies with Treasury guidance, and includes an Annual Governance Statement.	Comply	The Annual Report and Accounts is published each year and laid before Parliament before the summer recess.
Comply with NAO requirements relating to the production and certification of their annual accounts.	Comply	NAO are responsible for the auditing of the Annual Report and Accounts. It is worth noting that CCFE is also audited by the European Commission for the work they fund (approx. 2/3 of the Authority income).
Have effective systems of risk management as part of their systems of internal control.	Comply	There are individual risk registers for each department/major project. The key risks are raised to the Corporate Risk register and reported to the Executive, Board and Assurance committees. These are also reported to BIS and discussed at the annual BIS risk review meeting.
Ensure an effective internal audit function is established which operates to Government Internal Audit Standards in accordance with CO guidance.	Comply	There is an internal audit function that reports to the CEO, CFO and the Audit Committee. Audit actions are reviewed monthly at the Executive sub-committee for Operations, and reported to the Audit Committee. Compliance forms part of the Corporate

Principles of good corporate governance	Assessment	Comments
		performance measure for all staff.
Have appropriate financial delegations in place understood by all relevant staff and stakeholders. Effective systems must be in place to ensure compliance with these delegations and the systems are regularly reviewed.	Comply	The delegation matrix is published on the internal management system. All members of staff with delegated authority have to sign that they agree, and the financial system is used to enforce certain delegations. These have all been reviewed during 2013/14.
Have anti-fraud and anti-corruption measures in place, and clear published rules governing claiming of expenses, with systems in place to ensure compliance. Information on expenses claimed by board members and senior staff should be published.	Comply	Both Anti-Fraud and Anti-Corruption policies are in place. The code of conduct for employees is part of the Conditions of Employment Manual. Fraud prevention measures are outlined in the Finance manual. Members of staff with financial delegations are required to undertake anti-fraud training. Fraud is also covered under the 'Responsible for Information' e-learning, which is a mandatory course for all staff. The Finance manual also contains details about 'Entertainment, Gifts and Hospitality'. A log is kept of all prospective gifts/hospitality, whether accepted or not. Executive's expenses are published on the website. Directors' expenses and benefits are provided in the annual report & accounts (Remuneration report).
Establish an audit (or audit and risk) committee with responsibility for independent review of the systems of internal control and external audit process.	Comply	The Board Audit Committee is responsible for ensuring that there is an independent review of internal systems and processes. Representatives from internal and external audit (NAO) attend the meeting, and the chair of the Audit Committee has direct access to them.
Take steps to ensure objective and professional relationship is maintained with external auditors.	Comply	The relationship with NAO is the responsibility of the CFO and head of Financial Accounts. There is a good working relationship, with pre-audit and other regular meetings.
Comply with BIS guidance with regard to any department restrictions on spending.	Comply	The delegations outlined in the Authority finance manual are directly related to the financial delegations from BIS. These

Principles of good corporate governance	Assessment	Comments
		are updated as required if new delegation letters are issued.
Report to Corporate Finance with management accounts and Grant In Aid authorities.	Comply	The Authority submits monthly and quarterly results and estimates to BIS corporate finance via the EPM system. Annual results on the BIS Chart of Accounts are submitted to be incorporated into the BIS Annual Accounts.
Communication and Engagement		
The public body should establish clear and effective channels of communication with stakeholders.	Comply	One of the 10 strategies is stakeholder engagement. There is a comprehensive set of channels for communication with BIS, EPSRC, EU, EUROfusion, FAB, Universities, NDA etc. These include monthly updates with BIS, regular meetings and reports on progress to EPSRC and the EU on progress against the key programme objectives, and regular update meetings/conferences etc. There is also an active science and educational outreach programme.
The public body should make an explicit commitment to openness in all activities. Engage and consult with public on issues of public interest or concern and publish details of senior staff and board members with contact details.	Comply	This is covered on the website in the publication scheme. The website also contains details of Executive and Board members and contact details.
The public body should hold open board meetings or an annual open meeting.	Explain	The Board meetings are not held in open forum, given the commercial and personal sensitive nature of some of the discussion. Redacted minutes are produced and published on the website. The Authority is fully open on fusion research however, with open evenings, tours, outreach to schools and colleges etc.
The public body should proactively publish agendas, minutes of board meetings and performance data.	Comply	Slightly redacted Board minutes are published on the website. Corporate performance data is included in the annual report and accounts.
The public body should establish and publish effective	Comply	The publication and FOI section of the website give clear

Principles of good corporate governance	Assessment	Comments
correspondence handling and complaint procedures, and make it simple for members of the public to contact them/make complaints. Complaints should be investigated thoroughly and be subject to investigation by the Parliamentary Ombudsman. Performance in handling correspondence should be monitored and reported on.		instructions on how the public can get information, and the complaints procedure is outlined here: https://www.gov.uk/government/organisations/uk-atomic-energy-authority/about/complaints-procedure
The public body should comply with any Government restrictions on publicity and advertising, with appropriate rules in place to limit use of marketing and PR consultants. Have robust and effective systems in place to ensure the PO is not engaged in political lobbying, includes restriction on board members attending Party Conferences in a professional capacity.	Explain	The BIS delegation letter sets out the publicity and advertising restrictions, to which we comply. We report annually to BIS Communications on our spend, which is for items such as public outreach and open evenings etc. The Board and Executive are reminded regularly of restrictions on political neutrality. The Conditions of Employment Manual has a section on conflict of interests for all employees including relating to political activities.
The public body should engage the Sponsor Group appropriately especially in instances where events may have reputational implications on the department.	Comply	The monthly meetings with the sponsor team are used to raise any issues that may lead to reputational impact on the Authority or BIS.
Conduct and Propriety		
A Code of Conduct must be in place setting out the standards of personal and professional behaviour and propriety expected of all board members which follows the CO Code and form part of the terms and conditions of appointment.	Comply	Terms and Conditions of employment are defined by BIS. The Board members follow the Nolan 7 principles of public life.
The public body has adopted a Code of Conduct for staff based on the CO model Code and form part of the terms and	Comply	A code of conduct is included in the Conditions of Employment Manual.

Principles of good corporate governance	Assessment	Comments
conditions of employment.		
There are clear rules and procedures in place for managing conflicts of interest. There is a publicly available Register of Interests for board members and senior staff which is regularly updated.	Comply	Conflict of Interest is covered in the Conditions of Employment Manual. Board members interests are published on the website and in the annual report & accounts.
There are clear rules and guidelines in place on political activity for board members and staff with effective systems in place to ensure compliance with any restrictions.	Comply	Conflict of Interest is covered in the Conditions of Employment Manual. Board members interests are published on the website and in the annual report & accounts. Political activity is actively discouraged through reminders at election time etc.
There are rules in place for board members and senior staff on the acceptance of appointments or employment after resignation or retirement which are effectively enforced.	Explain	The framework document agreed between the Authority and BIS confirms that the Authority will comply with all relevant government policies and guidance, including the Cabinet Office 'Code of conduct for Board Members of Public Bodies' which stipulates a number of rules around political appointments during and after Authority appointment. The Authority does not currently have a formal procedure in place to ensure this, but will consider how to best ensure that these rules are complied with.
Board members and senior staff should show leadership by conducting themselves in accordance with the highest standards of personal and professional behaviour and in line with the principles set out in respective Codes of Conduct.	Comply	The annual review of Board performance includes confirmation/assessment that Board members are operating to the 7 principles of public life.

Annexes

Annex A: Consultation Survey on UK Atomic Energy Authority

Non-departmental public bodies (NDPBs) are organisations that sit at 'arm's length' from Ministers and have varying degrees of operational autonomy and independence from Ministers. As part of the reform programme, all NDPBs have been examined to ensure that they perform a necessary role. While the UK Atomic Energy Authority is an NDPB and therefore part of government it is viewed as being outside of ministerial control. All reviews have to identify whether the roles of NDPBs could be moved closer into government with ministerial control, or out of Government into the commercial sector.

1. In which role do you come into contact with The UK Atomic Energy Authority (Tick all that apply)

- Delivering sustainable fusion energy
- Delivering world class research and innovation to a broad range of sectors
- Training scientists and engineers
- Ensuring the maximum benefit to the UK from the ITER and other related advanced energy and technology opportunities
- Managing the Shareholder Programme Agreement
- Other

2. Are there activities or functions within the UK fusion programme which could be delivered by a commercial body?

- Yes (if yes answer 3)
- No (Go to 5)
- Don't Know (Go to 5)

3. Which of these activities could be commercialised? (Please select all that apply)

- Delivering sustainable fusion energy
- Delivering world class research and innovation to a broad range of sectors
- Training scientists and engineers
- Ensuring the maximum benefit to the UK from the ITER and other related advanced energy and technology opportunities
- Managing the Shareholder Programme Agreement
- Other

4. What benefits could be gained from commercialisation of these activities?

5. Would there be risks attached to the fusion programme being run outside of government, in the private sector, university or other form?

6. Would the fusion programme benefit from greater Ministerial oversight, either as an executive agency or part of a government department? Please explain your answer

7. Are there risks attached to The UK Atomic Energy Authority remaining part of Government? Please explain your answer

8. Does the private sector have the capability to lead fusion research?

- Yes – Now
- Yes – in the long term (10+years)
- No
- Don't know
- Other (please specify)

9. Could any of The UK Atomic Energy Authority functions be merged with another public body?

- Yes (If yes go to 10)
- No (Go to 12)
- Don't know (Go to 12)

10. Which of the following functions could be merged into another public body?

- Delivering sustainable fusion energy
- Delivering world class research and innovation to a broad range of sectors
- Training scientists and engineers
- Ensuring the maximum benefit to the UK from the ITER and other related advanced energy and technology opportunities
- Managing the Shareholder Programme Agreement

11. What public body, if any, do you think The UK Atomic Energy Authority functions could be merged with?

12. As the UK Atomic Energy Authority has a wide remit we are aware that respondents may not want to answer all the questions in this survey. Please indicate below which further question areas you would like to complete.

- Investment in Fusion Research
- Development and Retention of Skills for the Fusion Programme
- Culham and Harwell sites

Section two: Investment in Fusion Research

13. Does the UK need a fusion energy programme?

14. What more could be done to encourage private sector investment in delivering sustainable fusion energy?

15. How could the UK attract more European funding into developing science facilities in the UK?

16. What more could be done to encourage private sector investment in research and innovation around fusion energy?

17. Is the UK Atomic Energy Authority the best organisation to take innovation from fusion research into commercial applications?

18. What more could be done to encourage private sector investment in training scientists and engineers around fusion energy?

19. The UK's contribution towards The UK Atomic Energy Authority research is mostly funded through the Engineering and Physical Sciences Research Council (EPSRC). Is this the correct funding path?

20. Would the UK Atomic Energy Authority be able to secure EU funding from EURATOM and RCUK energy programme without UK Govt sponsorship and oversight?

21. Would the UK Atomic Energy Authority be able to secure sufficient funding as a commercial entity?

- Yes – Now
- Yes – in the long term (10+years)
- No
- Don't know

Section Three: Development and Retention of Skills for the Fusion Programme

22. The UK Atomic Energy Authority well works with the private sector to develop skills and expertise in the following areas?

	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Science					
Engineering					
Other					

23. How far do you agree with the following statement: The UK Atomic Energy Authority well works with Universities to develop skills in the following areas:

	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Science					
Engineering					
Other					

24. What is the role of universities in Fusion Research?

25. In your opinion how well does The UK Atomic Energy Authority join together the different research streams from EU and UK to create a coherent programme?

26. What specialist skills are needed for the UKs fusion programme? (Please select all that apply)

- Scientific Theory
- Scientific Applied
- Chemical Engineering
- Structural Engineering
- Systems Engineering
- Electrical Engineering
- Project Engineering
- Mechanical engineering
- Computer engineering
- Nuclear Engineering
- Energy Engineering

27. Are there organisations other than The UK Atomic Energy Authority that could or do develop the above skills in the UK?

28. Does promoting these skills within the UK require government support?

29. What more could The UK Atomic Energy Authority do to promote/retain the skills needed for the fusion programme?

30. The UK Atomic Energy Authority plans to open an apprenticeship college on site. How far do you agree with the following statements:

	Strongly Agree	Agree	Neither	Disagree	Strongly disagree

An on-site apprenticeships college will improve access to relevant skills for The Authority					
Investing in apprenticeships improves retention in The Authority					
The plan will have a negative impact on the local sixth form college					
Apprentices will have more access to teachers and teaching resources					

Section Four: Culham and Harwell sites

31. To what extent to you agree or disagree with the following statement: The UK Atomic Energy Authority uses their property assets efficiently and effectively to support their objectives?

- Strongly Agree
- Agree
- Neither Agree or Disagree
- Disagree
- Strongly Disagree

32. What do you see as the benefit of having the Culham fusion facility in the UK?

- Benefits to UK industry
- Development of scientific and engineering skills
- Benefits to universities
- Benefit to UK Govt.
- Increased innovation
- Join up between science and private sector
- Other (please specify)

33. How does Culham feed into the fusion programme?

34. What do you see as the benefit to the fusion programme of having the Harwell research Park?

- Benefits to UK industry
- Development of scientific and engineering skills
- Benefits to universities

- Benefit to UK Govt.
- Increased innovation
- Join up between science and private sector
- Other (please specify)

35. How does Harwell feed into the fusion programme?

36. Does the Joint Venture at Harwell benefit public and private investment in science?

37. How could the joint venture be improved?

38. Is there any long term benefit to The UK Atomic Energy Authority of having created two science parks in the Oxford area?

Section Five: General Questions about the operation of The UK Atomic Energy Authority

40. How far do you agree with the following statements:

	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
Work programmes at The Authority are joined up					
There is an appropriate amount of oversight of the different areas of work					
Findings from one area are easily fed into other areas of work					
The role of the boards at The Authority is clear and easily understood					
The Authority benefits from having experienced and respected board members					
The lead in times for projects starting at The Authority enables it to be responsive					
Programmes are managed effectively					

41: How far do you agree with the following statements about the Authority's Environmental impact?

	Strongly Agree	Agree	Neither	Disagree	Strongly disagree
The Authority does everything it can to minimise its environmental impact					
Property is managed efficiently and effectively					
The Authority is conscious of its energy use and does everything it can to minimise it					
The Authority is conscious of its water use and does everything it can to minimise it					

Annex B: UKAEA Stakeholders

Fusion Research: DECC, Academic, Private Sector, NNL, EPSRC, STFC, TSB

Fusion Deliverable: OFGEM, DECC, DEFRA, UKTI, MAS

Training/Education: Academic, Private Sectors, H/FE Students, Apprentices, Accrediting Bodies

Developing Markets & Capability: DECC, Private Sector

Pension Fund: UKAEA

Insurance/Nuclear Issues: NDA

Science Parks: BIS, UKTI, MAS, NDA, Oxford Council, Cadarache

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Contacts us if you have any enquiries about this publication, including requests for alternative formats, at:

Department for Business, Innovation and Skills
1 Victoria Street
London SW1H 0ET
Tel: 020 7215 5000
Email: enquiries@bis.gsi.gov.uk

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