

The UK Atomic Energy Authority's mission is to deliver sustainable fusion energy and maximise scientific and economic impact



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UK Atomic
Energy
Authority

Annual Report and Accounts 2019/20



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CCS0720849132
978-1-5286-2076-5

HC 641

United Kingdom Atomic Energy Authority
Annual Report and Accounts
2019/20

Presented to Parliament pursuant to Sections 3(5)
and 4(3) of the Atomic Energy Act 1954

Ordered by the House of Commons
to be printed on 21st July 2020

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United Kingdom Atomic Energy Authority
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United Kingdom

ISBN 978-1-5286-2076-5

CCS0720849132 07/20

Printed on paper containing 75% recycled fibre content minimum

Printed in the UK by the APS Group on behalf of the Controller of Her Majesty's Stationery Office

CHAIR'S STATEMENT

"THIS YEAR HAS SEEN A MAJOR ADVANCE IN UKAEA'S ABILITY TO INNOVATE"



Thank you to everyone for playing their part. We are grateful to our partners, suppliers and external collaborators for their willingness and ability to adapt to the challenging times we found ourselves in. More than this, several of our teams mobilised to provide equipment, develop PPE and provide analytic capabilities in the effort to contain the COVID-19 pandemic.

I thank our excellent Board for playing its part in guiding and supporting Ian and his Executive Team, none more so than Norman Harrison with his breadth and depth of knowledge across the nuclear industry. Norman completed his term of office on the Board this year and we are grateful for his deep insights. We will continue to benefit from his wisdom in his role as strategic advisor.

Breakthroughs in science are crucially important in the quest for radical technological innovation. The UK Atomic Energy Authority has for many years been a leader in the science of fusion energy. With its mission to deliver sustainable fusion power, and its funding to design a low-cost compact fusion machine, this year has seen a major advance in UKAEA's ability to innovate. It has invested in new scientific and engineering capabilities, its people and its leadership team, new facilities, partnerships and skills, to maximise the scientific and economic impacts of its work.

The effort to create fusion power is one of the most ambitious global projects. The need to provide a carbon-free, reliable energy source makes it one of the most urgent. When I joined the UKAEA in August 2018 I knew it was seen as a world-leading scientific capability by its peers. What I hadn't appreciated was the appetite for success that is deeply engrained in the organisation's culture. This has enabled the leadership team to manage an impressive rate of growth over the past year, deepening core capabilities and adding new ones, breaking records on the way. The organisation has sustained important international collaborations and embarked on new public and private sector partnerships.

In the first three months of 2020 UKAEA demonstrated its capacity to adapt, when the serious nature of the COVID-19 pandemic became apparent. The excellent safety culture, a supportive team spirit and staff resilient at solving problems resulted in a fast and smooth change in working practices when the Culham Campus went into lockdown. Credit is due to everyone playing their part in looking out for their colleagues as well as to the Executive Team in their leadership of the transition, which enabled much of UKAEA's work to continue remotely.

We offer a warm welcome to our new Board members – Lady Eithne Birt, Mark Bayley, Luc Bardin and Stephen Barter – who joined in May 2020 and significantly increase the Board's capability to guide the UKAEA's mission across its broader range of activities.

Looking to the coming year, we will focus on the health, safety and wellbeing of our staff, and all those who visit and come to work at our facilities. We will seek to provide new opportunities for rewarding work and study experience, increasing our effort to improve equality, diversity and inclusiveness. We will do this through an exciting programme to develop the UKAEA's work at Culham, with new facilities and plans to improve our environmental sustainability. We are equally excited to be developing capabilities in other parts of the UK, and we look forward to opening our new Fusion Technology Facility in South Yorkshire.

Our quest to develop fusion energy has already led to exciting innovation in robotics, new materials, control systems, data analytics and engineering processes. We look forward to sharing some of the wonderful ideas from science, engineering and technology emanating from the UKAEA and to enthuse a new generation of people to become excited about the prospect of fusion energy.

Professor David Gann, CBE
Chair
July 2020

UKAEA AT A GLANCE

Mission

To deliver sustainable fusion energy and maximise the scientific and economic benefits

Goals

Core Values

- ▶ Innovative
- ▶ Committed
- ▶ Trusted

Underpinning Behaviours

- ▶ Safety
- ▶ Equality
- ▶ Sustainability
- ▶ Responsible management of public funds

Be a world leader in fusion research and development

- ▶ Operating **JET** on behalf of the European Commission
- ▶ Managing and delivering the **UK Fusion Programme**
- ▶ Running **MAST Upgrade**, the UK's premier fusion device

Drive economic growth and high-tech jobs in the UK

- ▶ Operating **RACE** as a centre of excellence in robotics
- ▶ Operating **MRF** as a unique facility for materials research
- ▶ Developing the new unique Fusion Technology and H3AT facilities

Enable the delivery of sustainable fusion power plants

- ▶ Pioneering the **STEP** programme to design a UK concept fusion power plant
- ▶ Playing a leading role in the EUROfusion DEMO conventional fusion power plant design

Create places that accelerate innovation and develop skilled people for industry to thrive

- ▶ Develop **UKAEA infrastructure and facilities**
- ▶ **Train people** for fusion and adjacent sectors

The UK Atomic Energy Authority (UKAEA), based in South Oxfordshire, is a world leading research organisation. We are an executive non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy leading research in fusion and related technologies, with the aim of positioning the UK as a leader in sustainable fusion energy.

In these and the pages to follow, we provide a detailed account of UKAEA's performance in 2019/20. The overview section provides a summary of our mission, strategy and performance, our facilities and operating model, our approach to risk, and our stakeholder engagement. This is followed in the performance analysis section by an in-depth analysis of our performance against our strategic objectives, a report on our sustainability and an overview of our financial performance in 2019/20.

2019/2020 ON A PAGE

Financial

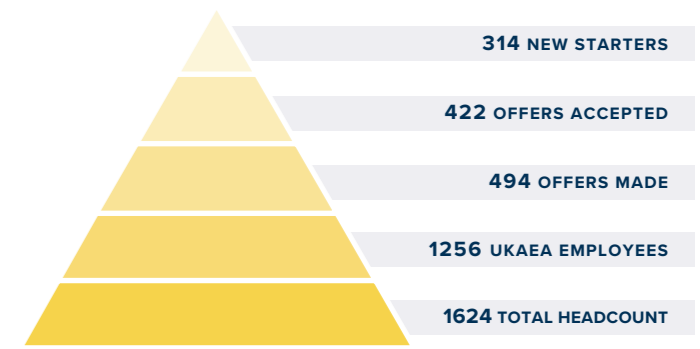
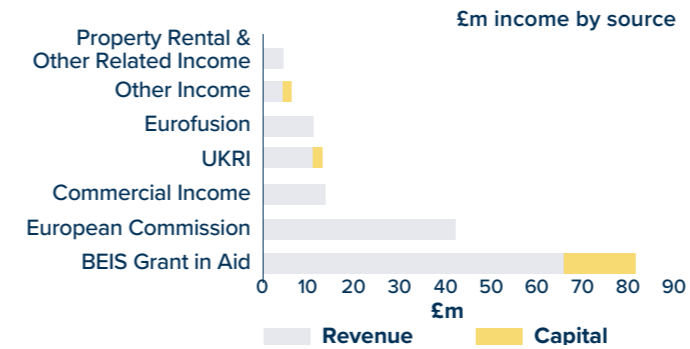
29% growth

Income in 2019/20
 ▶ £172.3million
 ▶ +29% from 2018/19

People

22% growth

Employees in 2019/20
 ▶ 1256 employees at year end
 ▶ +22% from 2018/19



Performance

PERFORMANCE HIGHLIGHTS IN 2019/20

Be a world leader in fusion research and development

The Joint European Torus (JET) justified its position as the world's leading fusion device by running two successful experimental campaigns, breaking several records and delivering new scientific insights towards achieving optimum fusion performance.

Drive economic growth and high-tech jobs in the UK

We broke ground for an exciting new facility in South Yorkshire which will provide a first-of-a-kind capability to test components under fusion-like conditions, enabling a vital new testing route for fusion technology.

Enable the delivery of sustainable fusion power plants

The Spherical Tokamak for Energy Production (STEP) completed its first year hitting all its milestones, involving over 140 consortia from UK industry and academia, to begin the concept design of a fusion power plant in the UK.

Create places that accelerate innovation and develop skilled people for industry to thrive

We expanded our Oxfordshire Advanced Skills apprenticeship training programme with a brand-new centre, with capacity for 350 apprentices in technical and engineering disciplines, with 80% of apprentices from local businesses.

CHIEF EXECUTIVE'S STATEMENT



"AT THE HEART OF UKAEA LIES A SHARED ALTRUISM TO MAKE THE WORLD A BETTER PLACE, TO DELIVER SUSTAINABLE FUSION POWER."

In 2019, Europe suffered its hottest year on record. Belgium, France, Germany, Luxembourg, the Netherlands, and the United Kingdom set all-time record high temperatures with thousands of deaths attributed to the heatwave. Globally, the five hottest years on record have been the last five years. The need for urgent action has never been so stark. In my opinion, climate change is the biggest challenge facing the world today; and I say that as COVID-19 has brought the world to a standstill and the economy into a deep decline. COVID-19 will undoubtedly affect our way of life for a few years to come, but we expect to recover from it in a matter of a few years. The World Health Organisation assessed that climate change will cause at least a quarter of a million additional deaths every year, with no horizon in sight. This is why the mission of the UK Atomic Energy Authority – to “deliver sustainable fusion power and maximise scientific and economic benefits” – is so essential. Fusion offers the promise of carbon-free, effectively inexhaustible, baseload, high energy-density power. In the fight to arrest climate change, fusion can be an important part of a carbon-free energy portfolio, and we are leading the charge to make this a reality.

Whilst our climate was setting records for the hottest place in Europe, this year we were setting records for fusion in the hottest place in the solar system – the inside of JET. JET is the world's leading fusion device, and JET remains the most significant part of our operations. This year we have achieved the highest ever heating power injected into JET; the highest rate of fusion neutron production in JET since the installation of the ITER-like wall that now clads the inside of the machine; and, even more impressively, we achieved a record time averaged neutron rate as well as the maximum ever-achieved neutron yield in a single JET deuterium pulse. These are remarkable achievements that continue to justify JET's position as the world's foremost fusion device.

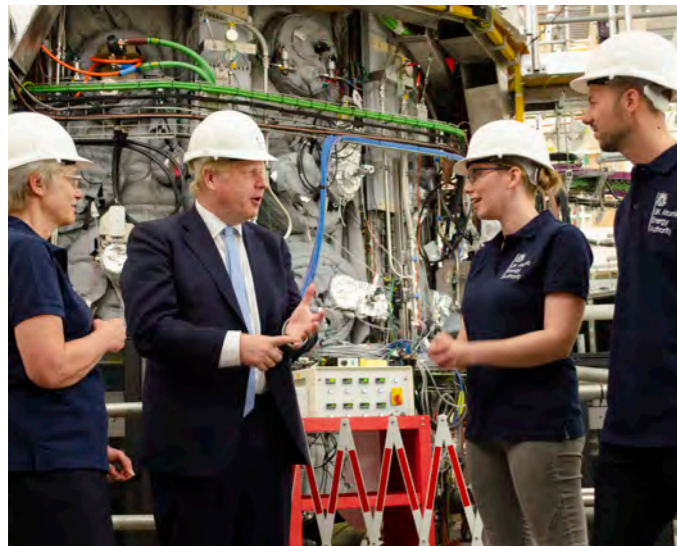
CHIEF EXECUTIVE'S STATEMENT

This year, the UK has demonstrated its commitment to delivering fusion as part of a portfolio dedicated to tackling climate change. Indeed, the UK became the first country in the world to commit to a legally binding target of net zero emissions by 2050. Following this, the Government announced a £222m investment in UKAEA to deliver the concept design of an innovative, low-cost compact fusion reactor – the Spherical Tokamak for Energy Production (STEP). Alongside STEP, the Government also announced a £184m 'Fusion Foundations' investment to deliver the foundations necessary for a thriving fusion sector, including improvements to the fabric of our Culham campus; expansion of our facilities to help UK business win work; establishment of a cluster of fusion-related companies; and a substantial increase in the scale of our apprenticeship programme. This is the single biggest investment in fusion in the UK since JET was built in the early 1980's and is symptomatic of the ambition at UKAEA, shared by UK government, to deliver fusion. The government commitment is evidenced by visits to UKAEA this year from our Prime Minister, the Chancellor of the Exchequer, the Secretary of State for the Department of Business, Energy and Industrial Strategy (of which UKAEA is a partner organisation), the Leader of the House of Commons and the Minister for Science, Research and Innovation.

This puts significant onus on us to deliver these shared ambitions. I have been delighted by the agility and pace of the response from the organisation this year. Our income increased from £134.0m in 2018/19 to £172.3m in 2019/20, a growth of 29%, which was matched by a commensurate increase in headcount. Recruiting and assimilating over 300 people is a sizeable effort, but one which the team have achieved with aplomb this year. We will need to do the same again in 2020/21.

An excellent example of this rapid growth is the STEP programme. Through STEP, the UK is pioneering a compact fusion reactor design, aiming to produce a design with lower capital cost than others. In the first phase of this programme, we will develop a concept design by 2024. If successful, this would be followed by a detailed engineering design phase thereafter. Despite beginning from a standing start this year, we have met our milestones on budget, and scaled up a national programme which now involves 500 people and over 140 industrial and university suppliers and consortia, with half of the work being done by our partners.

There are many examples of similar delivery performance across the organisation. This year our Materials Research Facility completed commissioning for radioactive samples and began receiving and analysing active samples for our customers. We began construction of our new Fusion Technology Facility in Yorkshire, the first UKAEA presence away from Culham for over a decade. Our robotics centre, RACE, continues to go from strength to strength. We have commissioned the Telescopic Articulated Robotic Manipulator, a 10m long robotic arm for payloads over 100kg where we can test new control systems, sensors and tools. RACE has now exceeded capacity, so we have dug ground on an extension to the centre after only four years of operation. We have welcomed over 100 apprentices into our new Oxfordshire Advanced Skills centre, which opened a year early and on budget. OAS has been a remarkable success, providing brilliant people for UKAEA and over 20 partner companies who train their apprentices 'in the work environment' at Culham. On the back of this success, we will be trebling our apprentice training programme to over 1000 young people in the next few years.



Boris Johnson, PM, engaging with UKAEA employees

CHIEF EXECUTIVE'S STATEMENT

This success has been spear-headed by David Martin, who this year retired from the Authority after 42 years, having joined as an apprentice himself and finished as our COO. After decades of incredible service, I am delighted that David will continue to lead the expansion in our apprentice training in the near term. We have appointed a very worthy successor in Lyanne Maclean who has had a baptism of fire dealing with COVID-19.

In the last few weeks of this financial year we have had to respond to the COVID-19 pandemic. For an organisation operating large-scale science and engineering facilities, the transition to the vast majority of our people working remotely has significant implications. I am proud of the agility of the organisation to mobilise to remote working within a day. To give one example, on the day that we decided to cease on site operations, the MAST Upgrade team transitioned from commissioning magnetic coils and power supplies to completion of the installation of sixty-nine concrete roof beams weighing up to 11 tonnes apiece leaving the machine in a passive state of safety. Under usual circumstances this is a sizeable task, but to implement at short notice and do so safely, quickly and with high quality shows what our people are like. You learn a lot about an organisation in crisis, and I have learned, once again, that we have a high calibre, dedicated and supple team.

After 1,317 days since the UK referendum on EU membership, this year the UK formally left the European Union and the Euratom Research and Training programme. Until the end of 2020 this does not affect our role in Euratom programmes, so we continue to be an active participant and grant recipient in EUROfusion, ITER and F4E programmes. Discussions are ongoing between the UK government and the European Commission concerning the UK's future relationship, with the political declaration signed between both parties clear that the UK would consider an association agreement to Euratom, enabling UKAEA's continued participation in programmes in a similar fashion as today. In the meantime, the support and collaboration of our European partners has been steadfast. Our participation in the EUROfusion programme is at a record high with nearly €14M awarded to the UK and nearly a quarter of the leadership roles

filled by UKAEA staff. Meanwhile, ITER has met many milestones this year, including the completion of the tokamak building, with approximately 40 UK companies playing critical roles in assembling the largest scientific collaboration ever undertaken by humankind.

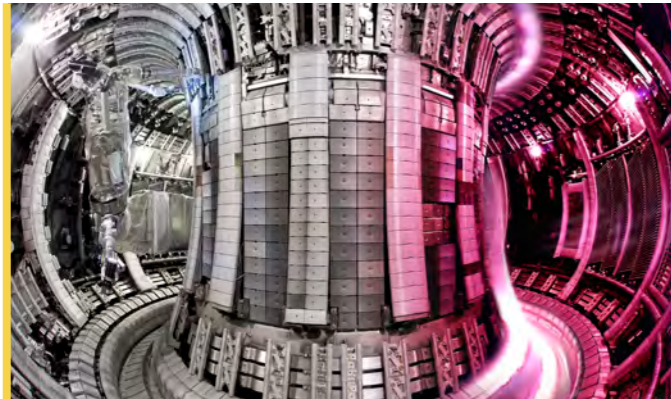
Despite the uncertainty regarding our future relationship with Euratom, I am continually impressed by the passion, the endeavour and the brilliance of our people. This level of uncertainty could cripple a business operating in an internationally competitive field, but our staff have delivered throughout, with equanimity and unswerving focus. At the heart of UKAEA lies a shared altruism to make the world a better place, to deliver sustainable fusion power. EU exit and COVID-19 will, after much disruption and a national collective effort to overcome them, pass into the history books. But addressing the climate emergency will persist as the defining issue of our generation – UKAEA's mission will be ever more important and this year has evidenced that we are on the right path to deliver.

A handwritten signature in black ink, appearing to read 'Ian Chapman'.

Ian Chapman
Chief Executive and Accounting Officer
July 2020

UKAEA FACILITIES

JET



Effective confinement and optimised performance of hot fusion fuel will be fundamental to a successful fusion power plant. JET, the world's largest and most capable fusion facility, is operated by the UK for exploitation as a key part of the EUROfusion roadmap to fusion electricity. Capable of using tritium, JET is a model for the next generation fusion device, ITER, and is the best facility to address the challenges ahead of ITER operation.

Inside JET vessel

MAST Upgrade



Fusion both requires and generates heat in abundance, and a commercial fusion power plant must be able to handle excess heat in a safe and effective manner. MAST Upgrade is one of the world's largest "spherical" tokamaks. MAST-U has new unique features focused on exhausting heat and will be developed and exploited with EUROfusion. MAST-U will utilise an extensive set of detailed measurements using advanced spectroscopy, atomic physics, lasers, neutrons and microwaves.

MAST Upgrade

MRF



Fusion will require new and novel materials, capable of withstanding the harsh environment of a fusion power plant. The UKAEA Materials Research Facility (MRF) allows advanced analysis and tests of materials relevant to fusion (and fission), including materials activated and damaged after neutron irradiation or exposed to tritium. It is a part of the National Nuclear User Facilities (NNUF), linked to the Henry Royce Institute.

MRF facility

RACE



A cost effective fusion power plant must be maintainable, and this will depend heavily on robotics. RACE, Remote Applications in Challenging Environments is a centre to develop remote maintenance and robotics techniques for fusion and other applications. It builds on UKAEA's extensive experience of remote handling on JET. The EUROfusion DEMO remote maintenance programme is led from RACE.

RACE facility

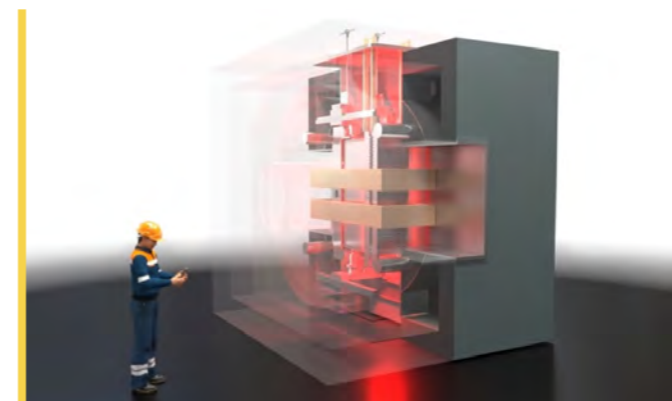
H3AT



Tritium is a key fuel for a self-sustaining fusion power plant but, as a radioactive isotope of Hydrogen, is challenging to work with. The Hydrogen-3 (tritium) Advanced Technology facility (H3AT) is a new facility which will open in 2021. It will have facilities for exposing materials to tritium, developing efficient tritium separation and purification techniques, and R&D on tritium removal at low and high concentration from solid, liquid and gaseous materials.

Interim H3AT facility

Fusion Technology



The complex environment of a fusion power plant requires innovative design and careful testing of manufacturing and components. A new set of Fusion Technologies Facilities (FTF) will open in 2021, including a facility in South Yorkshire, and will include an evolving range of bespoke capabilities in three sub-facilities: a Materials Technology Laboratory focusing on small sample testing techniques, a Joining and Advanced Manufacturing Technology Laboratory, and the Module Testing Facility to offer a first step in fusion-relevant testing environments for metre-scale components.

CHIMERA rig in the Fusion Technology Facilities

MISSION, STRATEGY AND PERFORMANCE

UKAEA's Mission

To deliver sustainable fusion energy and maximise scientific and economic benefit

Fusion is the process that powers the stars; energy is released as light elements, under enormous heat and pressure, fuse to form new heavier elements releasing the huge energy reserves abundant in matter. In the face of a changing climate and dwindling fossil fuel reserves, fusion offers the potential for a safe, abundant, carbon-free, reliable baseload energy supply – our challenge is to control and sustain this process to provide meaningful energy whilst maximising the wider benefits for society. UKAEA, operated on behalf of the UK Government, has pioneered fusion research for many decades for the fusion industry, our staff and the UK public by building strong international partnerships, an ambitious domestic fusion programme and supporting a thriving private sector.

Strong international partnerships	Ambitious domestic programme	Thriving private sector
UKAEA operates JET in partnership with the European Commission and maintains a high level of involvement and leadership in ITER. UKAEA scientists contribute to and lead on many collaborations with our international partners across the globe, driving innovation in the fusion sector. We benefit by inputting and influencing fusion research in the US, Europe and Asia, and receiving expertise, input and collaboration to help us advance our fusion programme.	The UK domestic fusion R&D programme is world leading, focused on the new STEP programme and supported by best in class expertise developed at the UKAEA in plasma physics and tokamak operations (JET, MAST-U); remote maintenance (RACE); materials testing (MRF); tritium handling (H3AT); and fusion technology. UK Universities partnering with UKAEA provide cutting edge research and high-quality graduate and post-graduate training.	UKAEA's technical capability and facilities have helped UK firms to win €0.5Bn of contracts from ITER with another €1Bn to win potentially. UKAEA facilities host an increasing number of tenants adjacent to the fusion sector, and apprentice training at UKAEA provides technical skills vital to economic growth from technical industry. We are beginning a large programme of work – the Fusion Foundations programme - to revitalise our campus and expand our facilities to create a fusion cluster.

UNDERPINNING FOUNDATIONS

UKAEA's infrastructure on Culham campus provides the environment needed to deliver our mission and strategy.
UKAEA facilities, provides support for international partners, domestic research and industrial partners to progress fusion in the public and private sectors.
UKAEA's skills growth programmes, including the apprenticeships within OAS, the graduate scheme and PhD support are providing training for future generations of scientists and engineers in the fusion sector.

CORE VALUES AND BEHAVIOURS

UKAEA are committed to enacting our strategy in an **innovative, committed and trusted** manner, focussing on a delivery culture built on **safety, equality, sustainability, and responsible management of public funds**.

Strategic objectives

UKAEA has developed a set of high-level long-term corporate objectives to drive the advancement of our mission and strategy. In 2019/20 we undertook to review our mission and objectives, ensuring that the result is well defined and ambitious. These four objectives sit at the base of all UKAEA activities:

- 1 Be a world leader in fusion research and development
- 2 Drive economic growth and high-tech jobs in the UK
- 3 Enable the delivery of sustainable fusion power plants
- 4 Create places that accelerate innovation and develop skilled people for industry to thrive

Performance Overview - Milestones

In 2019/20 we achieved 83.5% of our milestones. This is broken down by programme objective below:



A detailed analysis of our performance in 2019/2020 is provided in the performance analysis section.

OUR OPERATING MODEL

Our operating model enables us to progress our mission and defines our approach to delivering on our strategic objectives. It is designed with a focus on:

- ▶ The safety and wellbeing of our staff
- ▶ The delivery of our major R&D programmes
- ▶ Support and development for our business units
- ▶ High quality and robust assurance across all of our activities

What we do



Research and Development

Experimentation, modelling and engineering producing knowledge to advance fusion and related fields.



Tokamak Operation

Operating and managing two tokamak machines on Culham campus: JET, operated under contract to the European Commission; and MAST Upgrade, the UK's new and novel spherical tokamak.



Facility Operation and Management

Operating the RACE and MRF business units, and developing, the Fusion Technology and H3AT facilities, providing unique capabilities for us and our stakeholders.



Training the Next Generation

Developing skills for the future fusion sector through the Oxfordshire Advanced Skills apprentice training centre, our graduate scheme, and PhD students.



Site Management and Development

Managing Culham campus for UKAEA activities and tenants, and the public share of the Harwell campus Joint Venture, alongside STFC.

How we do it

Safety

Safety is our highest priority and UKAEA operates with a robust safety culture, supported by a certified health and safety management system, underpinned by integrated risk management and control, with top down leadership, a dedicated safety team and expert individuals authorising operations.

Assurance

As we design and develop new technology, plant and processes it is essential that we achieve high standards of quality and governance in the work we do. This includes acting in a responsible and ethical manner with our partners and supply chain, adhering to our values with appropriate governance of risk.

People

To achieve our mission, we need diverse and talented people working in an environment that challenges and stimulates innovation and produces future leaders in fusion. We support and develop staff, and manage our talent pipeline, with a dedication to equality, diversity and inclusivity.

Financial Resource

Our major sources of funding are from the UK Government, through our sponsor department BEIS and the Energy and Physical Sciences Research Council fusion grant, and from the European Commission through a bilateral operating contract for JET.

Technical resource

Our work is state-of-the-art and demands a varied range of skills. In areas where skills are highly specialised our technical resource is embedded within teams. In other areas, we operate a centralised resource management to ensure our programmes deliver efficiently and effectively.

External Partnerships

We cannot design a fusion reactor in isolation, and engagement with external partners in industry and academia, both domestic and international, is key to our delivery.

What we did in 2019/20

- ▶ Impactful research in areas including plasma physics, materials science and component testing. ✓
- ▶ Leading in several international programmes of fusion R&D ✓

- ▶ Two successful experimental campaigns on JET ✓
- ▶ More than 37MW of heating injected into JET ✓
- ▶ Commissioning of MAST Upgrade reached the final stages before experiments can begin ✓

- ▶ £14M income from customer contracts in 2019/20 ✓
- ▶ Ground broken on new facility in South Yorkshire ✓

- ▶ 1256 UKAEA staff with 314 new starters ✓
- ▶ 29 new UKAEA apprentices ✓
- ▶ 32 new graduates ✓
- ▶ PhD students supported from the UK and internationally, including 9 centres for doctoral training ✓

- ▶ Secured funding for the Fusion Foundations programme to revitalise Culham campus and create a fusion cluster ✓
- ▶ 4 new buildings completed ✓
- ▶ 5 new buildings in progress ✓
- ▶ Tenant space >95% occupied throughout the year ✓

ASSURANCE AND RISK MANAGEMENT

We have a three lines of assurance model and this provides the UKAEA Board with an appropriate level of comfort that we are managing risks properly. Each line of assurance provides a level of oversight, appropriate to their position within the business. The model allows each risk owner to draw from a breadth of information and rely on assurances obtained at the most appropriate level, relevant to the risk being managed.

THREE LINES OF ASSURANCE MODEL



Our Chief Executive (as Accounting Officer) is responsible for reviewing the effectiveness of the systems of risk management and internal control. That review of the effectiveness of these systems is informed by the work of senior managers within UKAEA who have responsibility for the development and maintenance of the internal control framework, an internal audit function and comments made by the external auditors in their management letter and other reports.

The Risk Review Group is a dedicated risk monitoring committee whose purpose is to review challenge and moderate risks ensuring balance and consistency across functions and divisions.

Quarterly risk reports are submitted directly to the Executive Committee with key risks being reported bi-annually to the Board. Additional reports may be submitted by exception as advised by the Head of Assurance.

A bi-annual risk and audit mapping report is also submitted to the Audit Committee and relevant risk information may also be reported to various other committees as requested.

Risk information also supports management review, audit programming and forward planning processes as required. Subject to the sensitive nature of some risks, the owner of the risk register ensures appropriate communication with other interested/affected parties.



Engineers prepare a snake robot for testing

OUR RISK MANAGEMENT

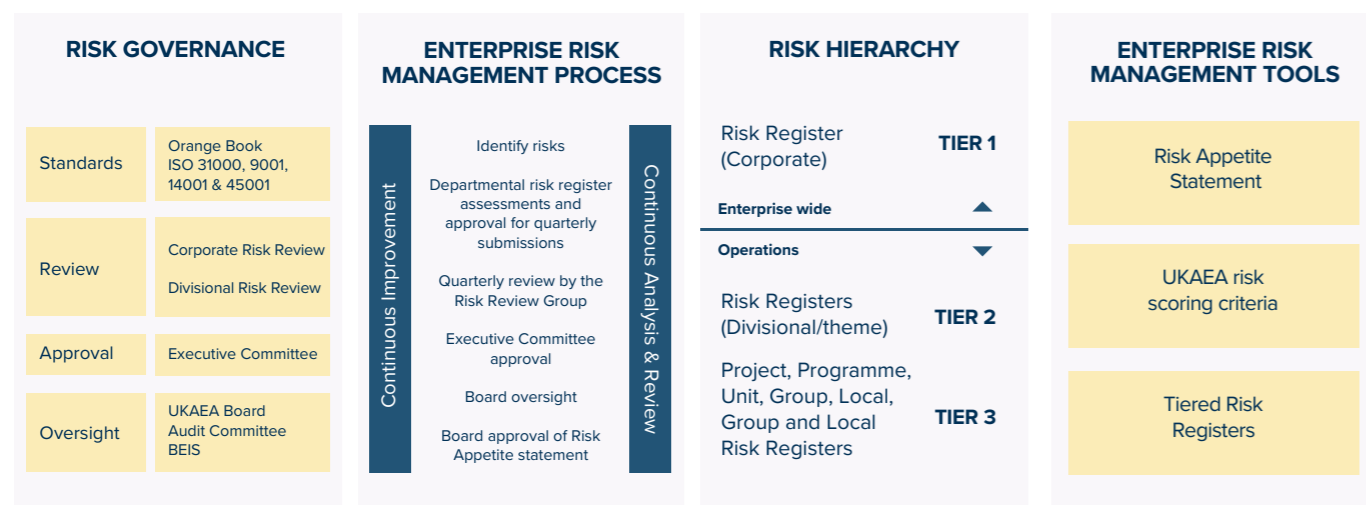
The early identification and effective management of risk is fundamental to the achievement of our mission, goals and strategic objectives. Our approach encompasses managing risk across our broad range of activities at operational, tactical and strategic levels.



An overarching Enterprise Risk Management process ensures that strategic and other UKAEA wide risks are effectively mitigated in line with the Treasury's 'Orange Book' and ISO31000. This is underpinned by specialised risk management processes designed to meet the specific needs of Programme, Project, Safety, Environmental and Fraud related risks. Effective governance of the process allows for escalation and reporting of risk to appropriate tiers of management including the Executive Committee, Audit Committee and the Board. Additionally, the Integrated Audit programme is informed by regular mapping of risks to ensure adequate coverage of all key risks.

Our framework for managing risk is embedded across the organisation and benefits from the ongoing commitment and participation of leadership

UKAEA RISK MANAGEMENT PROCESSES



ROLES AND RESPONSIBILITIES

The UKAEA Board has overall responsibility for our risk appetite, determining the amount and type of risk that we are willing to take to meet our strategic objectives. Our Chief Executive (as Accounting Officer) is accountable to Parliament for ensuring that all risks are managed effectively. On behalf of the Chief Executive, the Head of Assurance has been appointed to coordinate deployment of the risk management arrangements, ensure consistency of approach and periodically report risk to the Executive Committee, Audit Committee and the Board.

Ownership of tactical, operational and sub-operational risk registers is assigned to relevant senior managers, and individual risks are owned by the most appropriate team or individual. The Corporate Risk Review Group, which meets quarterly, provides oversight of corporate, programme and major project risks, reviewing the status and the progress of mitigations identified by the risk owners.

The Board formally reviews key risks bi-annually in conjunction with UKAEA's risk appetite statement. The risk landscape is used to inform the business strategy and the audit programmes to aid management in the delivery of business objectives. Performance of programmes and major projects including current status, risk and financial metrics, is reviewed on a monthly basis by the Executive Committee.

RISK LANDSCAPE

UKAEA's programme is internationally leading, and with this position comes a number of challenges as the UK transitions from the EU and Euratom. However, the Government has confirmed that it remains committed to collaborating internationally on fusion R&D and is ready to consider a relationship in line with non-EU Member State participation in Euratom R&T, provided that this represents value for money and is in the UK's interest. Furthermore, it is widely recognised that the extension of operations of JET will be hugely beneficial for the ITER project.

At the time of writing, the UK remains in a restricted state due to the COVID-19 pandemic. The threat has been managed as a live issue through our business resilience processes however there will be a lasting risk for many aspects of our operations. This places particular emphasis on our continued need to deliver major programmes, such as MAST Upgrade and STEP, and to meet key milestones for EUROfusion. Our delivery depends on our people and with continually high rates of growth in the organisation, the challenge to recruit the skills necessary to deliver intensifies.

The announcement of the full £222m funding for STEP and, latterly, £184m Fusion Foundations programme bring many new opportunities and, with them, risk. STEP is an ambitious programme with an overarching goal to develop a commercial fusion reactor and the technical risk of the programme is commensurate to this ambition. Fusion Foundations will seek to develop Culham into a fusion cluster with a major programme of infrastructure development. Elements of the programme depend on local development and infrastructure, and UKAEA continues to foster a positive relationship with local authorities to ensure our shared development goals are met.

OUR RISK APPETITE

Our risk appetite and the achievement of our goals demands ambition and varies according to the type of risk. It has full commitment of the organisation led by the UKAEA Board.

HIGH SCIENTIFIC RISK

In order to maintain the UK's position as a world leader in fusion we are prepared to push the boundaries of known science and, on occasions, step into the unknown. At the same time, we need to ensure the integrity of our science is excellent and we can fully support any contentious scientific claims with robust evidence to maintain our reputation.

HIGH BUSINESS DEVELOPMENT

If we are to achieve our goals and be successful at growing business for UKAEA and UK industry, we need to be prepared to pursue some speculative prospects where the risk of commercial failure may be higher than the we would normally tolerate. To mitigate these risks, we ensure robust management arrangements are in place to monitor when prospects are not developing as intended and to realign activities to limit future loss.

MED OPERATIONS

We have robust operational and engineering processes and systems. We expect technical staff to exercise good technical judgement in operations and comply with internal processes and other applicable requirements.

MED PROGRAMME MANAGEMENT

We aim to balance resources, capabilities and progress to comply with declared programmes. We are prepared to consider re-prioritisation of lower priority programme elements to deliver high priority programme goals, provided the risk to budget compliance is low.

LOW SAFETY AND ENVIRONMENT

The high standards of safety, health, and environmental protection needed to undertake world-class research at UKAEA are only achieved through the vigorous commitment of everyone, including top management, to continual improvement. Our goal is, therefore, to cause no harm to people, property or the environment.

LOW ETHICAL

UKAEA is committed to carrying out its research, engineering design, enterprise and other activities within a comprehensive ethical framework. It expects all those that undertake work on UKAEA's behalf to demonstrate high standards of ethical and professional behaviour.

OUR PRINCIPAL RISKS

WORLD LEADING RESEARCH
 Be a world leader in fusion research and development

ECONOMIC GROWTH
 Drive economic growth and high-tech jobs in the UK

FUSION DELIVERY
 Enable the delivery of sustainable fusion power plants

PEOPLE & PLACES
 Create places that accelerate innovation and develop skilled people for industry to thrive

RELATES TO ALL

RISK DESCRIPTION	STRATEGIC PRIORITY	MITIGATIONS ENACTED	RISK MOVEMENT
Strategic			
UKAEA does not meet key KPIs related to JET operation		We drove the critical path in key KPIs and secured the additional resource to do this, making these activities our highest priority across the business.	↑
MAST-U is unable to deliver its first campaign in 2020		We raised the project profile making it our second priority across the business with a re-baselined project plan under strong project management principles.	↓
Delivery of the H3AT building and facilities is delayed		We enacted reviews to ensure relevance, continuity and that objectives can be fulfilled within budget. We enacted a brief hiatus of this project to allow focus on JET delivery during this year.	↓
UKAEA is unable to satisfactorily retire technical risk in the STEP concept design		We developed a risk reduction strategy and worked extensively to establish good working relationships with internal and external stakeholders, with a unique programme board.	NEW
Campus development is delayed by external restrictions		We developed a strategy for the next block of outline planning and maintain a good dialogue with the local planning authority.	↑
Operational			
Staff capability and capacity are insufficient to deliver objectives		We progressed alternative methods of securing resources, taking a talent pool approach to recruitment and improving our HR processes. We are working with Cabinet Office on provisions to improve attractiveness and retention.	↔
Complexity and novelty of UKAEA activities bring potential for serious injury or accident		We have a mature health and safety management system which is certified to OHSAS 18001. We established good working relationships with all local services and partners, agencies and authorities.	↓
JET breaks down or underperforms		We completed JET Risk Reduction projects, established a maintenance procedure, undertook lessons learnt, enacted refurbishments and conducted a walkdown of the JET facility to identify hazard assets, implementing actions as required.	↓
UKAEA information security is insufficient		We took regular backups on network drives and compute clusters software. We have encrypted emails and files and operate multi-factor authentication for off-site use using Office365, with a trained team of Information Asset Owners.	↑
Lack of investment in existing property assets impacts on operations		We addressed long-term lifecycle issues and refurbishment of space by investing significant sums in building and site maintenance, achieved through responsible financial measures.	↔

IMPACT OF COVID-19

UKAEA RESPONSE

In 2020 the COVID-19 pandemic struck, bringing change to all areas of life. At UKAEA we have responded swiftly and decisively at all stages to ensure that our staff, contractors and tenants remain as safe as possible. On 23rd March 2020 we ceased operations on-site and transitioned to remote working. In the following months we have enacted a plan to return to an operational state on-site, with most staff remaining at home. We are committed to supporting our staff, contractors and suppliers in this difficult time – we have supporting our staff who cannot work their hours, we have enacted a retention scheme for key contractors, and we have endeavoured to fulfil our obligations to suppliers. In a staff survey conducted in May 2020, 98% of our staff felt supported by UKAEA during the COVID-19 outbreak. We successfully restarted the JET device, achieving a first plasma since the COVID-19 pandemic on 18th June, ahead of the next experimental campaign which started on 6th July with several hundred EU scientists participating remotely.

UKAEA CONTRIBUTIONS TO THE NATIONAL EFFORT

- Skills** – We have a wide and varied set of skills among our staff which we made available to the national effort.
- Supply Chain** – Our Special Techniques Group were designated as Key Workers to continue production of components for the supply chain to the NHS.
- Manufacturing** – We coordinated manufacturing capabilities for ventilator components through the Crown Commercial Services and High Value Manufacturing Catapult.
- Supporting local services** – We have used industry connections to provide a laser cutting service to aid with production of face shields for local NHS and care workers
- PPE** – We have donated large volumes of facemasks and gloves to local hospitals and used our facilities to manufacture thousands of visors.
- Supporting R&D** – We manufactured test samples of a new design of adaptor as part of a ventilator project for Imperial College Healthcare NHS Trust as well as supplying software engineers to develop long-range pandemic forecasting models which are informing government policy.

WORLD LEADING RESEARCH Be a world leader in fusion research and development	ECONOMIC GROWTH Drive economic growth and high-tech jobs in the UK	FUSION DELIVERY Enable the delivery of sustainable fusion power plants	PEOPLE & PLACES Create places that accelerate innovation and develop skilled people for industry to thrive	RELATES TO ALL
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KEY RISKS FROM COVID-19	STRATEGIC PRIORITY
Continuing impact of COVID-19 causes milestone slippage, loss of fusion progress and funding.	
Reduced working efficiency, due to the move to remote working, impacts short term delivery.	
Failure to embed new ways of working and take our people with us on the journey impacts long term delivery.	
COVID-19 damages development of UK fusion supply chain.	
Challenging economic landscape exposes UKAEA to the risk of supply chain failure.	
Delays to construction impact major building project timescales, causing potential shift of spend and delivery.	

STAKEHOLDER ENGAGEMENT

At UKAEA we have an ever increasing and diverse range of valued stakeholders, and effective and transparent communication on the world changing potential of fusion, the UK's leading role and UKAEA's mission is key to ensuring that the UK remains at the forefront of fusion.

THE UK GOVERNMENT

We benefit from a strong and transparent relationship with our sponsoring department, BEIS, meeting regularly with our sponsorship team, representatives from across BEIS and Ministers. We have also built key relationships with other Government departments.

OUR STRATEGIC PARTNERS

Strong strategic partnerships with professional bodies, trade associations and the industrial supply chain, help us to advance our mission.

OUR PEOPLE

We engage our staff through a variety of means to ensure that they have a shared view of our strategy, and a voice to be heard at the highest levels. Our CEO and Executive Team hold regular staff talks; we administer anonymous surveys across the organisation; and, we have a robust whistle blowing policy.

THE UK PUBLIC

As a responsible holder of public funds, we have a duty to engage the wider UK public in our exciting work. We hold regular open days, visit schools, participate in festivals and public events, maximise our media and social media coverage and give public talks and lectures to inform, excite and enthuse anyone interested in fusion.

UK ACADEMIA

Effective engagement with Universities (through visiting lectures, PhD open days, shared graduate and undergraduate studentships and research collaborations), drives innovation in fusion research and prepares the next generation of fusion scientists and engineers.

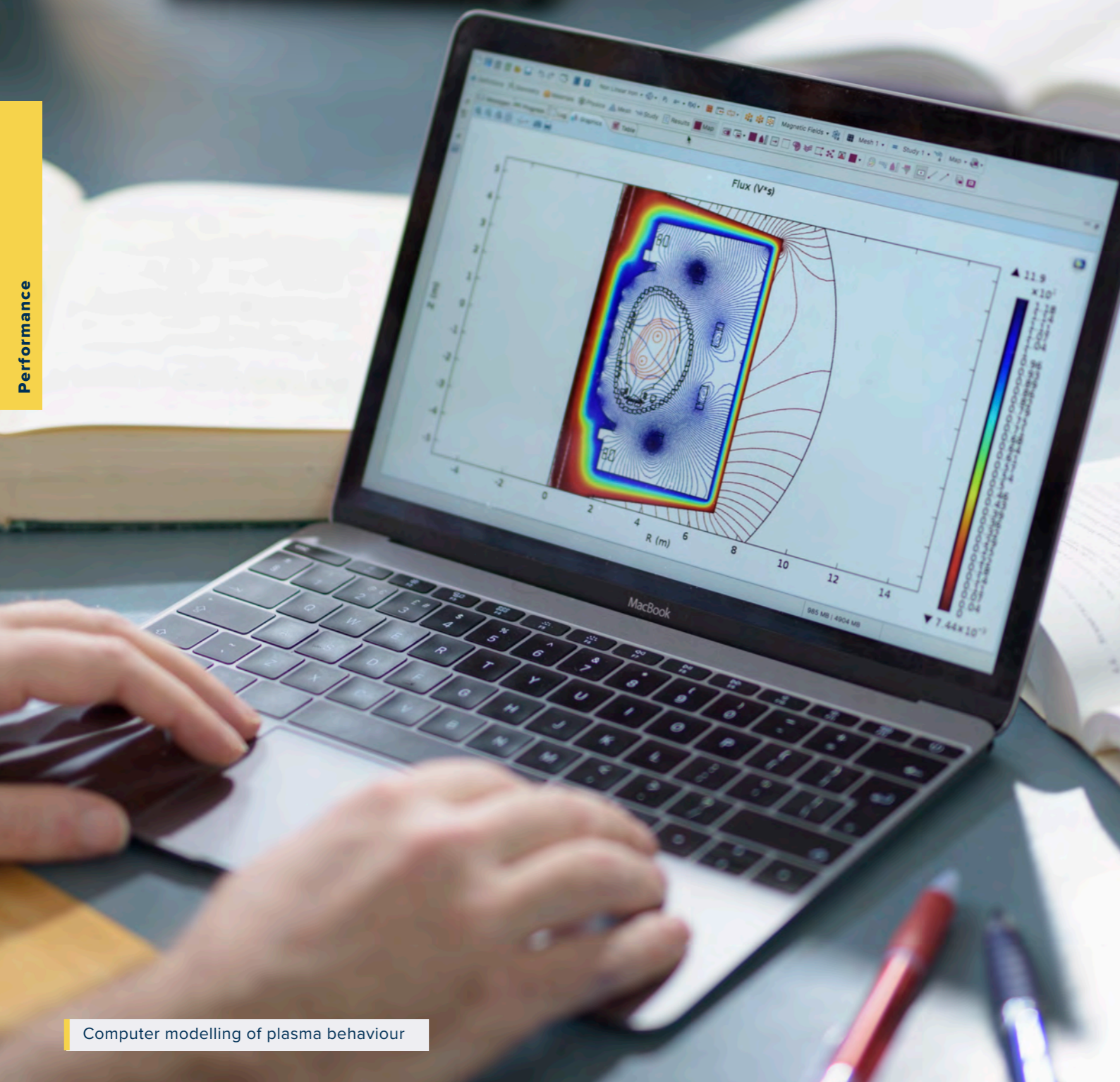
THE LOCAL COMMUNITY

UKAEA has over 1200 employees with a large portion living locally. We regularly engage with transport providers and local councils to ensure that we bring mutual benefit to the local community as we develop and thrive.



OBJECTIVE 1: BE A WORLD LEADER IN FUSION RESEARCH AND DEVELOPMENT

Performance



Computer modelling of plasma behaviour

HIGHLIGHT

The Joint European Torus (JET) justified its position as the world's leading fusion device by running two successful experimental campaigns, breaking several records and delivering new scientific insights towards achieving optimum fusion performance.

OVERVIEW 2019/20

- ▶ MAST Upgrade ran into several technical issues that prevented it from achieving its first experiments in the year. Nevertheless, commissioning of the new machine drew significantly closer to completion and in March the first current was run through its magnetic field coils since it was disassembled in 2013
- ▶ After several technical challenges which meant a late start to high performance operation, two highly successful experimental campaigns were run on JET, resulting in record heating powers supplied to JET plasmas, and sustained record neutron production from JET deuterium plasmas. The neutron rate is a measure of the fusion power in D-T plasmas and the value achieved is now approaching the equivalent of ITER's 500MW goal
- ▶ Building on smaller scale experiments in the US we installed on JET and are testing for ITER a new device called a shattered pellet injector. This is currently the favoured approach to protect the internal components of ITER in the event of an unexpected plasma termination
- ▶ With monumental effort from the teams involved we drew closer to the commissioning of the JET subsystems needed to handle tritium. Late supply and a series of subsequent system failures have caused substantial delays and this key milestone was not achieved in the year
- ▶ We successfully demonstrated the reduction of fusion waste liability by the process of detritiation, an important step in preparation of the eventual decommissioning of JET
- ▶ Our materials science programme contributed to ground-breaking research, causing re-evaluation of the application of a century old law of physics
- ▶ Designs are complete and all contracts placed on for a new, globally unique rig to test fusion components under combined heat and magnetic loads in the new Yorkshire UKAEA site
- ▶ We led a small pan-European project to develop a new capability which will be used to test the interaction and retention of tritium in fusion relevant materials
- ▶ We hosted the Prime Minister in August 2019 who was enthused by our world leading research

Performance

PERFORMANCE

▶ 44 / 73 milestones achieved in 2019/20

LOOKING FORWARD

- ▶ JET will continue to prepare for high performance D-T plasma, including the commissioning of the active gas handling system alongside the final preparatory experimental campaign in deuterium plasmas
- ▶ MAST Upgrade will perform its first full experimental campaign testing the Super-X divertor, a key step towards managing the excess heats in fusion reactors
- ▶ Planning will begin for the exploitation of our new facilities, including those being built in South Yorkshire and the new H3AT centre at Culham
- ▶ Continued involvement in the design of the ExCALIBUR project
- ▶ By the end of 2020/21 the majority of historical waste from JET will be processed and disposed of, exploiting the use of the detritiation process

UK FUSION PROGRAMME

The UK fusion programme focusses on fundamental science and research required to drive fusion forwards. The programme focusses on six key areas of R&D:

TOKAMAK SCIENCE

The tokamak science area covers fundamental research in the physics of tokamak plasmas through a portfolio of experimental, theoretical, analysis and modelling based activities conducted by a diverse range of experts. During 2019/20 our scientists led experiments both overseas, most notably on machines in Switzerland and Germany as part of the EUROfusion programme, and at home on JET where UKAEA scientists led key experiments to prepare for the next deuterium-tritium fusion campaign. This campaign will be key to fusion development and a unique capability of JET, and UKAEA provides both of the two Scientific Leaders for the EUROfusion JET programme. A strong backbone of theory and modelling runs in parallel to our experimental efforts, and 2019/20 saw major developments from our theory and modelling in key areas including: predictions of the start and end phases of plasmas for ITER; investigations of the accumulation of impurities in JET plasmas and routes to avoidance; large and realistic simulations of complex turbulent phenomena in the boundary of MAST and MAST Upgrade; and, predictions for the performance of heat exhaust systems in reactors of the future. A major new driver for the tokamak science area this year was STEP, where our knowledge and expertise will be a critical factor in reducing the technical risk of the STEP design, though the resourcing pressure to support STEP alongside existing commitments has required reprioritisation against some of the work needed to meet milestones.



Interior of MAST Upgrade

MAST UPGRADE

In 2013 the Mega Amp Spherical Tokamak (MAST) ran its final experiment, and the process to develop the machine into MAST Upgrade began in earnest. In 2019/20 we expected to see the first experimental plasma inside MAST-U, but this was not to be the case. As with any first-of-a-kind facility, unexpected technical challenges are a risk and delays in areas such as safety systems, heating systems and power supplies have combined to delay first plasma until 2020/21. Nevertheless, the project is now nearing completion and 2019/20 saw MAST-U take significant steps towards preparation for plasma. The focus in the year has been on commissioning the machine and subsystems. This has included ensuring that all safety systems are commissioned and operational, remedial work on key subsystems, and the second baking of the machine vessel where 85 grams of water was removed from the machine interior allowing it to be brought down to an operational vacuum. This year also saw the magnetic systems being returned to an operational state, first by commissioning their power supplies and latterly, in March, by running the first currents through the magnetic coils on the machine since 2013. These are all tangible steps towards plasma readiness, and 2020 is set to be an exciting year for MAST Upgrade.

ADVANCED COMPUTING

Fusion research can be computationally demanding, and we are building a team dedicated to addressing key computing challenges, developing a network with leading specialists in the UK and embracing new and emerging ideas to move the fusion computational capability forwards. We are a partner in the design and development of the ExCALIBUR project, a major new programme led by the Met Office to develop simulation tools in the UK to exploit the radically changing exascale supercomputing architectures of the future. Not only is it important to generate data, but it is also important to access it fairly, and we have been involved in the European FAIR4fusion project to generate an open data platform to open up data and make it easily accessible on a pan-European basis.

MATERIALS SCIENCE

Materials science is fundamental to fusion; a fusion reactor must be made of materials capable of tolerating its harsh environment, and addressing this challenge is a key part of the UK fusion programme. The materials science team have made significant progress in many areas during 2019/20 including fundamental theory and modelling of material damage, characterisation of plasma facing surfaces in machines, developing measurement techniques and analysis of irradiated material samples and validation of nuclear data for predicting material transmutation. During the year UKAEA scientists have played a pivotal role in advancing our understanding of material damage at low temperatures. By showing that defects in materials remain significantly mobile in heavy materials at cryogenic temperatures, the team (as part of an international partnership) identified limitations in the century old Arrhenius Law potentially prompting reevaluation of our fundamental understanding in the area. On the experimental side, the team continues to develop novel methods for testing materials, including the use of temperature gradients in material samples to rapidly increase the rate of testing. Irradiation experiments are being conducted in parallel to detailed modelling shedding light on the behaviour of material damage in similar conditions. Both development and validation of simulations remains an important topic, particularly with regards to nuclear data which is vitally important to allow accurate prediction of transmutation of materials in a fusion reactor of the future.

FUSION TECHNOLOGY

In 2019/20 the team has made advancements in several key areas including analysis methods for neutron spectra, systems modelling of fusion plant designs and the development and application of novel measurement techniques to assess component stresses and damage. The team are advancing the use of Digital Image Correlation, a non-contact measurement technique to undertake 3-D stress-strain analysis in circular samples, in collaboration with the University of Bristol. This reveals the true manner in which the sample fails and allows improved modelling of sample failure. In 2021/21 the team intend to apply the technique to large scale components to support virtual twin modelling of components in a new and unique testing facility being designed. This facility, called CHIMERA, will be a globally unique testbed for components under combined heat and magnetic loads under vacuum. Materials testing in a fusion relevant environment remains a major focus of the team and a key part of the fusion environment is the magnetic field. By analysing the complex chemistry of fusion structural materials, the team have shown that magnetic fields impact the rate of corrosion of surfaces and that this varies with the orientation of the field.

TRITIUM SCIENCE

Tritium, a radioactive isotope of hydrogen used to fuel the fusion process, can interact with materials in a manner that can change as materials are irradiated. In 2019/20 UKAEA led a European project to develop a unique facility to explore this issue. The combination of the new tritium capable material impregnation facility produced by the UKAEA with the analysis capabilities of European collaborators has produced novel fusion relevant results. With the planned commissioning of the new tritium laboratory at the UKAEA's Hydrogen-3 Advanced Technology (H3AT) facility, this system promises a unique new capability for fusion research.

JET OPERATIONS

JET is the world's largest and most powerful fusion device, hosted by the UKAEA at our Culham site on behalf of the European Commission. A large on-site team of scientists, engineers and support staff operate JET. The scientific exploitation of JET is managed by EUROfusion with JET receiving up to 350 visiting scientists from around Europe to participate in important and exciting experiments.

PREPARATIONS FOR HIGH POWER CAMPAIGNS

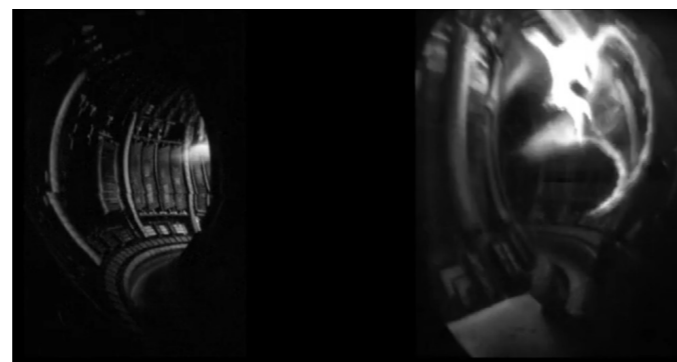
JET is now preparing for high fusion performance aiming to move towards and beyond the triumphs of JET's previous record-breaking D-T fusion campaign in the 1990s. After several technical challenges which meant a late start to high performance operation, JET ran two experimental campaigns in deuterium plasmas in 2019/20. The first campaign, running from June to December 2019 served a variety of different experiments on topics including: Investigating scenarios for simultaneously high performance and low heat fluxes to wall materials; injecting carbon based impurities to better understand the behaviour of JET's metallic wall; understanding instabilities in the plasma born out of the presence of high energy ions; and, optimising the two most promising scenarios in JET towards high performance in preparation for D-T plasmas. UKAEA scientists led many of these experiments and, particularly, the latter to design the experimental scenarios that will be used when JET runs high power fusion experiments once again. These efforts produced record breaking results; 3.1×10^{16} neutrons per second averaged over 5 seconds is the highest average neutron rate recorded in JET with the ITER-like wall, whilst 2×10^{17} neutrons is the highest neutron yield ever achieved in JET deuterium plasmas. These records are testament to the scientific excellence that JET continues to provide.

The first experimental campaign began with a delayed start after requiring longer than expected to bring the machine up to adequate performance, though delivered many successful experiments albeit in a delayed manner. The second experimental campaign, run from February to March 2020, achieved 503 successful pulses of 532 in total ending with a reliability greater than 95%; a drastic improvement. The aim of this second campaign

was high performance, and JET delivered. During this campaign, records were set both for the heating delivered to, and the neutrons produced in, JET deuterium plasmas. The successes of this experimental campaign were well recognised internationally as the most successful experimental campaign since the installation of the new JET wall.

SHATTERED PELLET INJECTOR

2019/20 saw the first use of an innovative device to prevent plasma from melting or damaging components of the reactor wall in JET. This process, which will also be scaled up to work on ITER, is called shattered pellet injection where a cryogenic deuterium-neon pellet is fired into the plasma to rapidly and drastically cool it. The introduction of the shattered pellet injector was the result of an international collaboration between ITER, EUROfusion, and Oak Ridge National Laboratory in the USA with the project being centrally managed by UKAEA. UKAEA scientists played key roles



Inside the JET vessel during an SPI experiment

in experiments to test the shattered pellet injector, which were successful in increasing the amount of energy dissipated by the process by over an order of magnitude. These experiments lay the foundations of a similar system for ITER which will be critical to ensuring ITER's longevity

ACTIVE GAS HANDLING SYSTEM

Tritium is a critical fusion fuel which must be handled carefully and precisely due to its radioactive nature. The JET Active Gas Handling System is a unique facility located on JET to process tritium during high power D-T fusion operations. This system, crucial for D-T fusion experiments, remained in a dormant state for over a decade and in 2019/20 the team began activities to recommission and upgrade the systems and subsystems in preparation for the next D-T fusion campaign on JET. These preparations were hampered from the outset due to supply issues. The technology within the active gas handling system and associated sub systems is highly bespoke which adds significant complexity and risk to commissioning tasks. Despite extreme efforts and dedication within the team of engineers and staff responsible for the system, a series of major technical issues and failures arising in key subsystems delayed progress and commissioning was not completed within the year. Effort remains high to bring these systems to full operation in 2020/21.

RADIOACTIVE WASTE PROCESSING

UKAEA takes a responsible and robust approach to the management of radioactive waste from JET. During the financial year 2019/20, 42128 kg of waste arose, 56112 kg of waste was processed, and 62715 kg of waste was consigned. This included 25635 kg of waste which was re-categorised as Out of Scope of Regulation (OSR) and 2000 kg which had been processed through our Materials Detritiation Facility; more waste was consigned from site than arose. We continued to exploit various waste routes and deliver against milestones and regulatory deadlines despite some operational challenges. Sealed sources have continued to be disposed within the time limit as set out in UKAEA's Environment Agency issued Permit. As well as the consignment of Low Activity - Low Level Waste (LA-LLW) and regular incineration consignments, our Waste Management team identified a new route for a drum of Intermediate Level Waste (ILW), which exceeded all UK incinerator acceptance criteria, avoiding the need for further on-site processing of this waste and achieving a considerable cost saving. Process optimisation within the Materials Detritiation Facility (MDF) continued in 2019/20, allowing the operation of two furnace runs per day, 4 days per week- maintaining an increased facility throughput at 60% greater than originally expected. Intermediate level waste treated in the MDF was consigned for disposal as Low Activation - Low Level Waste during the year, successfully demonstrating the liability reduction of fusion waste by detritiation.

OBJECTIVE 2: DRIVE ECONOMIC GROWTH AND HIGH-TECH JOBS IN THE UK

Performance



Inside of a 'MASCOT' manipulator

HIGHLIGHT

We broke ground for an exciting new facility in South Yorkshire which will provide a first-of-a-kind capability to test components under fusion-like conditions, enabling a vital new testing route for fusion technology.

OVERVIEW 2019/20

- ▶ The ITER Robotics test facility has successfully completed several critical tests for ITER and helped to support UK industry to win ITER contracts
- ▶ RACE has supported new activities in the nuclear sector in fuel debris retrieval by training external staff, running workshops and scoping digital mock-up systems
- ▶ The European Spallation Source (ESS) Active Cell Facility has progressed from design into manufacturing and the first on-site installation was completed to schedule
- ▶ The MRF expanded its work for users including several contracts for the international accelerator design community – a market sector not originally envisaged for MRF
- ▶ Despite delays to commissioning equipment, we delivered the first operation of MRF hot cells for external users following permission to operate at higher radiation levels, expanding the MRF offering to UK industry
- ▶ A contract has been placed for the design and build of a new facility at Culham to house materials research and testing facilities together with an integrated suite of tritium processing systems, supporting the fusion programme and industrial partners
- ▶ We broke ground in South Yorkshire for a new UKAEA facility to house an innovative testing rig, exposing fusion power plant components to fusion-like conditions to test their performance
- ▶ Due to the high priority of the JET Active Gas Handling system, a significant amount of resource was redeployed from H3AT limiting progress and delaying delivery of the facility
- ▶ Following the signing of an Implementing Agreement with ITER to share design information, a concept design has been developed for a Tritium research facility in H3AT that will enable important tritium studies for ITER and expand the capability for UK industry to bid for future ITER contracts
- ▶ UKAEA facilities collectively attracted nearly £14M in external customer income in 2019/20

Performance

PERFORMANCE

- ▶ 41 / 50 milestones achieved in 2019/20

LOOKING FORWARD

- ▶ We will establish a permanent presence in Yorkshire in our new centre with the detailed design of the facility now completed
- ▶ A complete concept design for the H3AT centre will be produced in 2020 and our H3AT team will collaborate with the ITER Organisation to ensure the facility is fully ITER relevant, ensuring UK industry gains unique experience
- ▶ RACE activities for the ESS will continue by completing the first Electrical Distribution & Signalling installation package at the Active Cell Facility in Sweden. At UKAEA, we will complete the engineering, design and installation of an in-vessel recovery system for JET as it prepares for D-T operation
- ▶ MRF will expand its range of equipment that can be operated with radioactive material and increase the amount of radioactive material that can be processed in our hot cells, providing a wider array of applications of industry
- ▶ We will increase the user base of MRF further in 2020/21 and apply for funding for more equipment, some of which will be housed in the new extension

PERFORMANCE REPORT

UKAEA is an active supporter of industry, engaging our supply chain with dedicated events and providing capability and support within our facilities. We have already supported UK industry to win around £500M of contracts from ITER, and continued support from our facilities will be key to positioning UK industry to target a further £1bn before ITER begins operations.

REMOTE APPLICATIONS IN CHALLENGING ENVIRONMENTS

The Remote Applications in Challenging Environments (RACE) centre at UKAEA is a national centre for excellence in robotics. Born out of decades of experience operating remote maintenance systems for JET, RACE continues to develop remote maintenance and robotic solutions for fusion and other similar fields. RACE has a portfolio of projects both supporting UKAEA's mission and for a variety of external stakeholders inside and outside of fusion, supporting economic growth by capitalising on the synergies between fusion development and other sectors.

As part of our support for ITER, RACE hosts the ITER Robotics Test Facility (IRTF) which launched three new projects in 2019/20 attracting more ITER investment into the UK. One of these, in collaboration with our Joining and Advanced Manufacturing (JAM) team at UKAEA, is addressing the fusion-wide challenge of qualifying remotely pipe welding; a critical task for the servicing of ITER during its operational phase. Investment in RACE continues to bring ITER contracts to the UK across the nation, providing jobs and economic growth both inside and outside of Oxfordshire.

Outside of fusion, RACE is procuring, installing, and commissioning the European Spallation Source (ESS) Active Cell facility in Lund in Sweden. The project has made great progress over the year with all major procurements now in contract and the design phase completing. The first installation of the crane rails was completed on time for full installation works to start this summer. RACE's work on decommissioning legacy nuclear fission plant expanded significantly in 2019/20, contributing to two demonstrations of integrated systems for end to end decommissioning for UK and international nuclear industry.

RACE has a widening research portfolio, enabling new methodologies involving machine learning, greater automation, and new techniques to be applied to our challenges both inside and outside of fusion. Of particular note is the RAIN (Robotics and AI in Nuclear) consortium where RACE is working with twelve universities to support new solutions to nuclear robotic challenges including automated gloveboxes and communications architectures for long term remote operations; developments that will have a wide application in industry outside of fusion.

MATERIALS RESEARCH FACILITY

The MRF is a facility at UKAEA for UK materials scientists in academia and industry to do experiments where radioactivity is too high for a university laboratory, but not requiring a nuclear licensed site. It has benefited from major investment from EPSRC, via the UK's National Nuclear User Facility (NNUF) and Henry Royce Institute for Advanced Materials (HRI) initiatives, as well as from UKAEA's own funding direct from Government. A major part of MRF work in 2019/20 was adaptation and installation of equipment purchased with this funding so that it can be operated remotely in shielded enclosures. Commissioning of this equipment was delayed in the year, however we received permission to operate both the hot cells (where radioactive experiments are carried out) and some of the scientific instruments at much higher levels of radioactivity than permitted hitherto. This greatly expands the MRF capability for fusion and adjacent sectors in the UK and overseas, increasing and improving its offering to UK industry.

In parallel, work for both external and internal customers was expanded. UKAEA's own work as part of fusion R&D included examination of tiles from JET (as part of the EUROfusion programme) and studies of how irradiation affects mechanical and other properties of candidate materials for fusion power stations. In addition, a range of university users – including many students – used the MRF for mainly fission-related research (some of these part-funded by the HRI). A major development was securing and executing work in a new market sector, i.e. the international accelerator community with new customers including organisations such as the European Spallation Source and Fermilab.

Government funding to extend the MRF building has been secured and much of the design work has been completed. Placement of a contract to build the extension is scheduled for mid-2020/21.

PERFORMANCE REPORT

In 2017 the UK Government announced the £86m investment as part of the Industrial Strategy Challenge Fund to establish two new facilities at UKAEA – the Fusion Technology Facilities (FTF) and the Hydrogen-3 Advanced Technologies (H3AT).

FUSION TECHNOLOGY FACILITIES

FTF will become a centre of excellence to provide a complete development life cycle for the materials and components that will be required to construct a future fusion power plant, covering material qualification, joining, design and manufacture, lifetime integrity and eventual decommissioning. These new capabilities will support the fusion programme, alongside the private fusion sector and wider industrial opportunities growing the technical skills base in the UK. Contracts have been placed for the new CHIMERA rig – a unique facility to study fusion component performance under fusion relevant conditions - which will be housed in our new centre in South Yorkshire. This is the first major regional presence for UKAEA outside Oxfordshire in over a decade.

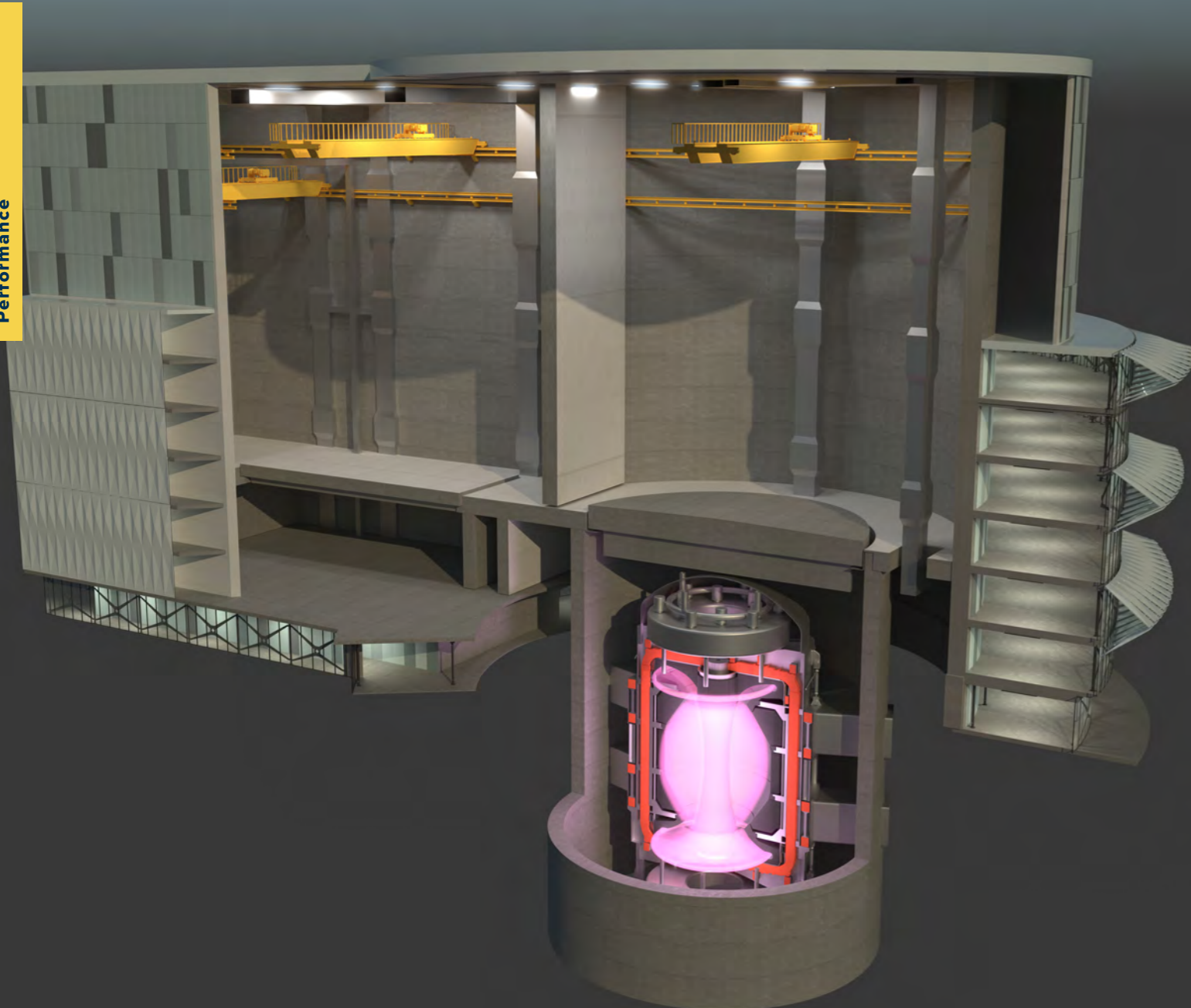
H3AT

H3AT will build a world class capability delivering the tritium technology required to fuel a future fusion power plant, enabling UK industry to win significant contracts and developing the next generation of UK tritium technologists. Resource on H3AT had to be reduced in the year due to a strategic redeployment onto the JET Active Gas Handling System. This significantly delayed progress, however H3AT attracted £8m in external income in 2020. Following the signing of an Implementing Agreement with ITER to share design information, a concept design has been developed for a Tritium research facility in H3AT that will enable important tritium studies for ITER.



Small radioactive material samples being handled in MRF hot cells

OBJECTIVE 3: ENABLE THE DELIVERY OF SUSTAINABLE FUSION POWER PLANTS



Concept design for the STEP building

HIGHLIGHT

The Spherical Tokamak for Energy Production (STEP) completed its first year hitting all its milestones, involving UK industry and academia, to begin the concept design of a fusion power plant in the UK.

OVERVIEW 2019/20

- ▶ From a standing start, we have built a team involving nearly 500 experts from across UKAEA and over 140 industry and university consortia to deliver the STEP programme
- ▶ We were awarded the full £222m funding required for tranche-1 of the programme, to the end of 2023/24
- ▶ We have developed a technical risk reduction strategy and made tangible progress on many of the technical areas necessary for a viable STEP concept design
- ▶ We have produced the preliminary concept design for robotic systems to transport and install power plant components weighing many tens of tonnes for the EUROfusion DEMO programme

PERFORMANCE

- ▶ 6 / 6 milestones achieved in 2019/20

LOOKING FORWARD

- ▶ STEP enters year two of five and the programme will move towards producing initial views of an integrated design for STEP
- ▶ Development of designs and reduction of technical risk in several key STEP design areas, alongside the identification of a credible plasma scenario
- ▶ Continued engagement with the supply chain, industry and academia will allow us to continue outsourcing the value of the STEP programme
- ▶ We will continue our support for the EUROfusion DEMO programme, primarily through machine design and testing within the RACE and Fusion Technology areas

SPHERICAL TOKAMAK FOR ENERGY PRODUCTION

The mission of the Spherical Tokamak for Energy Production (STEP) programme is to “design a commercially viable compact fusion power plant, collaborating with partners to build a UK prototype by 2040”. The STEP programme, first announced in the November 2018 Chancellor’s budget and later by the Secretary of State for BEIS in October 2019, is an audacious UK domestic programme to design and build a prototype fusion plant based on the spherical tokamak concept. The programme builds on the UK’s fusion leadership and engages both industry and academia across the nation. The initial 5-year tranche-1 of the programme, funded by the UK Government and managed by UKAEA, will produce a viable concept design alongside a host of benefits arising as the programme progresses.

2019/20 was STEP’s first year. From this standing start we have grown a young, talented, energetic and enthusiastic team to deliver the goals of the programme. STEP is unlike many of UKAEA’s other activities in that, whilst R&D is at the core of the programme, the eventual output is the delivery of a product – the STEP prototype reactor. With this in mind, the programme developed a delivery driven operating structure in 2019 focussing on three pillars of; commercial and programme development; product development; and programme management. The first year of the programme met its ambitious spending budget with 48% of the programme spend being outsourced to UK academia and industry, ensuring that STEP is a national programme. This has placed us in an excellent position to push forwards and deliver tranche-1.

The technical demands of STEP are high and research and technological development will be central to producing a viable concept design. Driven by a dedicated team alongside support from other areas of the organisation a significant R&D programme has begun in a wide variety of areas required to build STEP. In 2019/20 a technical risk reduction strategy was developed, and advancements have been made in fields including: Magnetic

joins to enable maintainable magnets capable of producing the field strengths needed to produce fusion in STEP; early designs for tritium breeding blankets needed to ensure the reactor can be self-sustaining; theoretical studies of plasma turbulence to begin to understand the performance that can be expected in STEP; the systems needed to heat and generate current in the STEP plasma; and, a review of possible materials from which to construct the machine from. Work packages are underway focussing on the enabling environment for STEP, including regulation, waste and decommissioning and the team are focussed on producing holistic integrated solutions.

EUROFUSION DEMO

DEMO is the EUROfusion programme to design and build a next stage power plant on the road from ITER. The STEP and DEMO programmes share synergies, and UKAEA supports the EUROfusion DEMO primarily through skills and capability provided by RACE, in remote maintenance systems, and the Fusion Technology programme.

UKAEA holds a leading role in the machine design and R&D activities for remote maintenance systems on DEMO. Our team of engineers has produced the preliminary concept design for systems to transport and install breeder blankets (key components in a fusion reactor used to produce tritium) weighing many tens of tonnes and around 12m long. Development of robotic systems is a major part of our portfolio, exploiting TARM, a large boom robot originally designed for JET, as a multipurpose deployment tool for robotic testing. In parallel new apparatus has been commissioned to explore automated task management using a pair of multi-purpose robots. There is also an extensive programme of in-bore cutting and welding of thick wall stainless steel pipes. This is an essential element of replacing reactor components reliably. This combination of design and early stage testing is key to developing the “device defining” remote maintenance systems required for any fusion reactor architecture.



The Telescopic Articulated Remote Manipulator is used in RACE to design new remote handling systems

OBJECTIVE 4: CREATE PLACES THAT ACCELERATE INNOVATION AND DEVELOP SKILLED PEOPLE FOR INDUSTRY TO THRIVE

Performance



Aerial view of the RACE (bottom) and JET (top) facilities on Culham campus

HIGHLIGHT

We expanded our Oxfordshire Advanced Skills apprenticeship training programme with a brand-new centre, with capacity for 350 apprentices in technical and engineering disciplines, with 80% of apprentices from local businesses.

OVERVIEW 2019/20

- ▶ Safety is our top priority and we maintain very high safety standards in all our activities
- ▶ An important part of our safety culture is visible leadership from our senior leaders and we enacted a more robust mechanism to prove visibility and track its effect. We judge that we need to take further steps to ensure that this tracking is consistent across the organisation
- ▶ We have introduced new EDI initiatives, led by a new EDI business partner
- ▶ We delivered 4 new buildings in 2019/20
- ▶ Consistent occupancy levels > 95% in our tenant space by valued commercial organisations
- ▶ Harwell Campus development accelerated in 2019/20, including beginning construction of the Vaccine Manufacture Innovation Centre, led by the joint venture Partnership
- ▶ We welcomed 314 new starters in 2019/20 with 425 offers accepted in the year
- ▶ We increased numbers on both our graduate and apprentice schemes to 32 this year, with 50 expected to start in September 2020
- ▶ The new Oxfordshire Advanced Skills centre was opened on Culham campus, with occupancy for 350 apprentices from many areas of local industry, including 29 new UKAEA apprentices
- ▶ We have improved our recruitment pipeline through successful summer and industry placement schemes
- ▶ We did not hit our target for timely completion of internal audit actions – these will be tracked, and ongoing improvement remains as a target for 20/21

PERFORMANCE

▶ 20 / 23 milestones achieved in 2019/20

LOOKING FORWARD

- ▶ In 2019/20 we secured £184million from the UK Government to revitalise Culham campus and create a fusion cluster. This programme kicks off in 2020/21 and will be a major focus for the next five years
- ▶ The significant infrastructure growth of both Culham and Harwell campuses will continue, with 5 buildings expected to deliver including our first in South Yorkshire, and following the signing of the Housing Infrastructure fund, development of the infrastructure around Culham site will accelerate
- ▶ As our portfolio expands, our sustainability ambitions grow, and a sustainable development plan will be developed to guide our growth
- ▶ In 2020/21 we expect similarly high levels of people growth
- ▶ Our accredited continuous professional development schemes encourage employees from all disciplines to become professionally recognised and in 2020/21 a new leadership programme will be developed, which will be offered to all levels of UKAEA leaders to enhance and develop leadership capability as our organisation continues to grow
- ▶ OAS will expand its offering with a greater range of technical apprenticeships in the coming year, including Level 6 Engineering
- ▶ UKAEA will continue its progress to implement the Athena Swan action plan and EDI strategy at all levels of the organisation

Performance



CULHAM SCIENCE CENTRE

Culham Science Centre is one of the three large internationally significant science and business centres in southern Oxfordshire which underpin the County's economic growth. It is owned and exclusively managed by UKAEA. UKAEA is already well on the way to achieving the further 1,000 jobs targeted in South Oxfordshire's Core Strategy with the site now supporting more than 3000 jobs in over fifty organisations. UKAEA's vision for Culham Science Centre is to be a leading global hub for innovation in fusion energy and related technology, engineering and design, supporting regional and national growth. Already, investment on Culham campus in RACE and other facilities is enabling industry across the nation to win contracts from ITER and the continued development of these campuses is expected to enable the creation of jobs and provide economic growth nationally.

To support its own programmes, UKAEA has an active construction programme in place which is supported by a masterplan of ambitious growth. This programme has delivered 4 new buildings in 2019-20, another 5 are underway in 2020-21 (one in Yorkshire) with a further 11 projects in development. Whilst the new buildings will provide a significant uplift in environmental performance against the old end of life buildings, UKAEA's aspiration is to go further than this and deliver enhanced environmental performance.

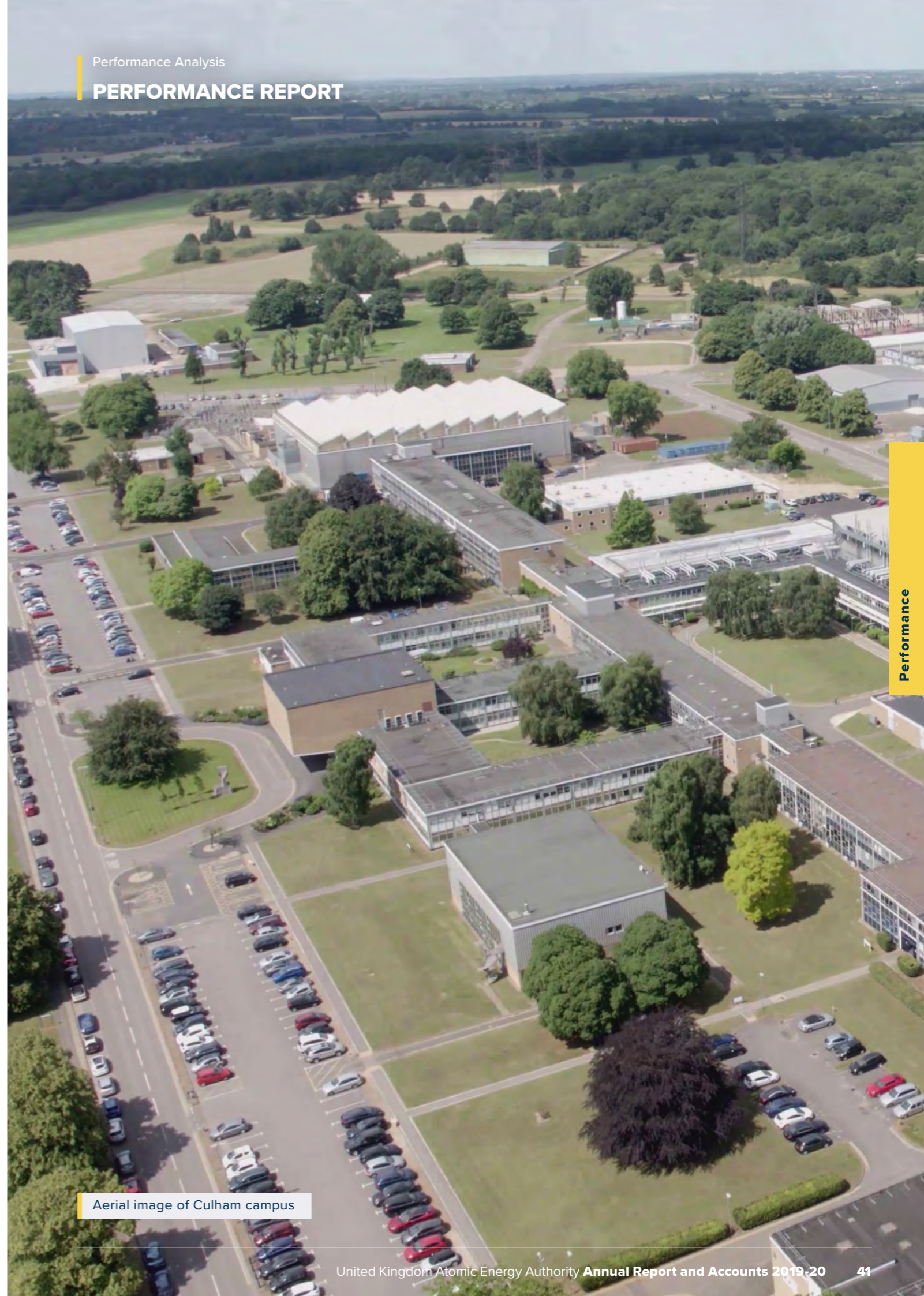
UKAEA continues to maintain a consistently high level of occupancy by valued commercial organisations. A delivery option for the first phase of new development has been agreed and the UKAEA has been working with government and potential investors to begin implementation.



HARWELL CAMPUS

The Harwell Campus is now one of the fastest growing science and innovation environments nationally. Together with STFC, UKAEA holds and manages the public sector's share in the joint venture Partnership which was established to develop the Campus. Employment on the Campus has increased from 4,700, in 2014 to over 6000 working in 200 different organisations.

In 2019/20 the Partnership embarked on another wave of development arising from the substantial further transfer of land from UKAEA at the end of 2018-19. The highest profile of these is the Vaccine Manufacture Innovation Centre (VMIC) which is now under construction and aims to make a significant contribution to the UK's capacity and resilience in this field. The Partnership continues to significantly raise the national and international profile of the Campus and has recently secured further investment from Brookfield Asset Management. Further reinforcing the Campus' significance nationally and internationally are the STFC developments which are underway and include the new Rosalind Franklin Institute, the Faraday Challenge headquarters, the National Space Test Facility and the Extreme Photonics Applications Centre.

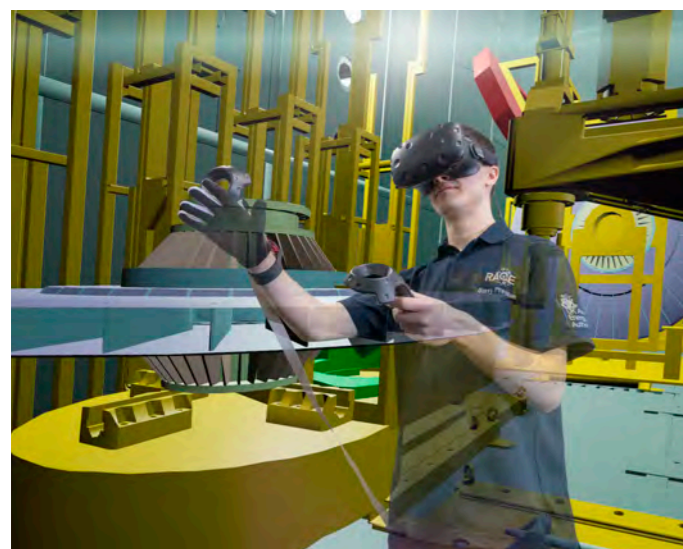


Aerial image of Culham campus

PEOPLE

UKAEA continues to nurture a culture that promotes research, innovation and leading-edge technological excellence and is committed to investing in its people. We continually seek to provide a working environment where people are given challenging and interesting work and frequently required to think innovatively about new problems.

Our continued world class reputation and increased contribution to the UK and other science and technology capabilities relies on the ability to attract, retain and develop first-class talent. 2019/20 has seen another year where employee numbers have increased with recruitment of 314 new starters in the financial year with 494 offers made and 425 offers accepted. Shortage areas such as control & instrumentation technicians, engineers (cryogenic, electrical, systems, process, mechanical, design), technical project managers and nuclear specialists are being addressed through a variety of recruitment campaigns, including targeted social media, recruitment fairs and hard copy adverts. Our recruitment fairs have been so successful that we intend to continue running them in the coming year. In parallel 2019/20 has seen us continue to improve our employee development programmes. Intake onto our highly valued and certified graduate scheme has risen from 18 in 2018 to around 50 due to start in September 2020.



A UKAEA apprentice working on a virtual reality project in RACE

APPRENTICESHIPS & OAS

UKAEA hosts the Oxfordshire Advanced Skills apprentice training centre which provides technical apprentice training to over 20 businesses across the local area, particularly focussing on areas of skills shortage and scarce resource. We had an exciting launch in October, a year ahead of schedule, when all the employers came together to celebrate the official opening by former UKAEA apprentice, Ross Brawn, Managing Director, Motor Sports and Technical Director for the Formula One Group and former Mercedes F1 Team Principal. This purpose-built facility can accommodate up to 350 apprentices per year. OAS is run by The Advanced Manufacturing Technology Centre (AMTC) who were appointed as the official training provider at the end of 2018.



A UKAEA apprentice training in the OAS facility at Culham

Supported by OAS, a record number of 29 new apprentices joined UKAEA in September this year, including 14 Level 3 Advanced Engineering Apprenticeships and 15 Professional Support Apprentices, in areas such as project management, finance and business support. We also continue sponsoring existing employees through upskilling apprenticeships to achieve technical and professional qualifications such as degrees and professional qualifications in Procurement, Communications, Finance and HR. We are continuing to expand the number and diversity of apprenticeships we offer, and this year is likely to be another record year. UKAEA has achieved the public sector target of 2.3% of new apprenticeships in the workforce.



EQUALITY, DIVERSITY AND INCLUSION

UKAEA is committed to supporting diversity and inclusion and creating an environment that is welcoming and inclusive. We want all our employees to be able to bring their whole selves to work and feel comfortable and supported in their working environment. In 2019 UKAEA was reaccredited with Athena SWAN Bronze Award and we are now working hard on our action plan and we have welcomed a new Equality, Diversity and Inclusion Business Partner to help us do this. The Athena SWAN initiative is helping to make gender equality part of UKAEA's overall strategy, and good practice from the Athena SWAN project plan is being used to develop inclusive strategies for all underrepresented groups and minorities. The UKAEA Executive is committed to EDI and each member is a strategic sponsor for a protected characteristic (as defined in the Equality Act). Lots of activities are underway including our EDI panel and Inclusion Ambassadors who are embedded within Departments and who run regular events which complement national initiatives such as Black History Month and Neurodiversity Celebration Week. Lyanne Maclean, COO, leads the EDI at UKAEA, and offers these words:

"I am delighted to be the EDI Executive lead for UKAEA. It's not just three words to me; this is something I believe in and know from personal experience to be of vital importance to individuals and to organisations. Celebrating difference and promoting equality allows individuals to thrive and harnesses their power to achieve great things. I hope to help us on our journey."



QUALITY, SAFETY AND ASSURANCE

HEALTH & SAFETY

Safety is our top priority, and this underpins all activity that we undertake. As part of this the need to support the health and wellbeing of our people is fully recognised. Our COVID-19 response has underlined our commitment to safety and to our people's health and well-being. We have augmented our routine annual health calendar -linked to national campaigns such as 'mental health awareness' and 'look after your heart' - and other resources such as mental Health advisors, Employee Assistance scheme and Inclusion Ambassadors with increased well-being messaging from the leadership and the publication of guides to home working, mental health and flexibility for those caring and shielding during COVID-19.

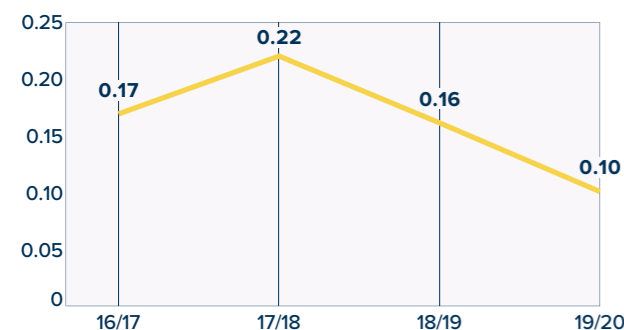


Our safety is monitored throughout the year via a set of established performance indicators, reported to the Operations, Assurance and Board Assurance Committees. Performance covers both leading and lagging measures. Lagging indicators have consistently indicated good performance, however we remain cognizant of the need to continue to develop our culture towards a more proactive one. In response, we have adapted to a more agile reporting which has proven to be a success, with a focus on compliance that will address the root causes delivering a more proactive than reactive approach. It is important to us that our leaders are visible within our safety culture and, whilst we enacted measures to improve visibility, we need to take further steps to ensure that this is consistent across the organisation.

Our aspiration that everyone goes home safely at the end of each day relates to our staff wellbeing too. We have several wellbeing

Accident Frequency Ratio

The number of Lost Time Accidents per year / Average number of workforce x 100,000



initiatives in place from our employee assistance programme, through to occupational health on site and plenty of lunchtime activities available. Our People team are accessible to all employees and we actively encourage everyone to come and talk to us about any wellbeing concerns.

The UKAEA was awarded the Royal Society for the Prevention of Accidents Gold Award for the ninth consecutive year, recognising the organisation's commitment to continuous improvement in accident and ill-health prevention at work.

MANAGEMENT SYSTEMS AND QUALITY

UKAEA is certificated to ISO 9001:2015, ISO 14001:2015 and OHSAS 18001: 2007. The supporting documented management system provides an integrated framework for the organisation's systems and processes regarding quality, the environment and health and safety. The management system and associated processes are subject to independent audit by AFNOR.

Our internal audit programme provides assurance to all interested parties that the required standards are being maintained and supports the organisation in its aim of continual improvement. Recent changes have included embedding quality resources within projects and the management of non-conformances. Further improvements are planned with the migration from OHSAS 18001 to the new safety standard ISO 45001:2017. These changes focus on developing and maturing UKAEA's management of quality, safety, health and environment in support of the organisation's overall mission and goals. UKAEA is certificated to ISO 9001:2015, ISO 14001:2015 and OHSAS 18001: 2007 and the supporting documented management system provides an integrated framework for the organisation's systems and processes regarding quality, the environment and health and safety.

SECURITY

UKAEA maintains an effective level of security at Culham Science Centre aligning closely with the BEIS security strategy and works to the Cabinet Office security policy framework. Audits and the annual Departmental Security Health Check continue to show that the security standards are being well maintained and further developed. As part of the new staff induction process mandatory security awareness eLearning training is compulsory and all staff with an emergency response role undertake the eLearning ACT security awareness course. In addition, a number of security related emergency exercises have been undertaken and a regular programme of these exercises is in place. These demonstrate that security arrangements are robust.

SUSTAINABILITY REPORT

ENVIRONMENT AND SUSTAINABILITY

The goal of fusion research is to provide a low carbon energy source for the second half of this century. Whilst on the path to sustainable fusion energy, we aim to make our progress as environmentally friendly as possible.

UKAEA takes its environmental responsibilities very seriously and ensures all statutory obligations relating to waste management and discharges to the environment are strictly complied with. Our Environmental Management System is certified to ISO 14001, the international standard that provides a system for managing environmental commitments and performance. In addition to ensuring ongoing compliance, UKAEA is also committed to contribute to long-term environmental sustainability. The actions we are taking for this are outlined below.

GREENING GOVERNMENT COMMITMENT (GGC)

UKAEA is exempt from GGC operational targets because the nature of the experiments is such that safe, technically and financially feasible energy efficient measures cannot be adopted to the extent required for meeting the commitments. However, for transparency purposes we report our emission, waste and resource consumption data in line with GGC requirements, also the actions we take for biodiversity, sustainable procurement, climate change adaptation and sustainable construction. Rural proofing is not applicable to UKAEA and this is therefore not included.

OVERALL OPERATIONAL PERFORMANCE

Energy and water consumption, as well as waste disposal volumes all vary year on year due to changes in plant operations. This therefore affects the total greenhouse gas emissions. During operational periods, electricity and water use increase, whereas in periods of plant shutdown, waste production increases. During 2019/20, UKAEA's annual energy usage and greenhouse gas emissions have increased compared to the previous year, which is the result of JET entering full operations for two experimental campaigns in the year.

BIODIVERSITY ACTION PLANNING

UKAEA maintains a biodiversity map of the Culham site, with initiatives including:

- maintenance of the established biodiversity beds and nature reserves
- composting green waste on site
- putting up bird boxes around site
- plantation of trees and shrubs chosen specifically to attract wildlife
- use of logs from tree surgery to build piles of logs for insects and tree surgery is done outside of the nesting season
- no spraying and cutting in areas where Bee Orchids grow.

Biodiversity is also considered part of our long-term campus plans and our new buildings are designed as part of the Building Research Establishment Environmental Assessment Method (BREEAM) to the Excellent standard.

SUSTAINABLE PROCUREMENT

Environmental standards are integrated as part of the tender process for our key contracts. We also observe the Government Buying Standards for Sustainable Procurement in the areas relevant to our activities.

CLIMATE CHANGE ADAPTATION

Projects with long term implications, such as new building construction projects, are being designed for durability and resilience. As part of these projects, high standards of flood and surface water management are also adopted. Sustainable construction

Our construction work prioritises sustainability performance by targeting a BREEAM Excellent rating in line with the Government Buying Standards for construction of permanent buildings.

SINGLE-USE PLASTIC REDUCTION

In line with the government's Consumer Single Use Plastics Scheme and working with our catering partner, we have eliminated or replaced with alternatives, common items such as plastic cutlery, cups, containers and packaging. Also, plastic free tea bags were introduced with paper string and tags. We are encouraging and incentivising staff to bring their own reusable receptacles for food takeaway, water and hot drinks. Water is served in refillable glass bottles in meetings, rather than single use plastic bottles. We are operating crisp packet recycling schemes at some key locations on campus and are bulk purchasing cereal and cleaning products to reduce packaging.

REDUCING EMISSIONS FROM TRANSPORT TO SITE

A new bus service has been recently introduced that connects the Culham site to Abingdon, the nearest town. This helps to reduce employees' dependence on their cars for getting to work. In 2019, the percentage of car drivers was estimated to be around 71%, compared to 83% in 2008 when we first started collecting this data.

We also run a Lift-share scheme which helped to save 206 tonnes of CO2 emissions since the scheme started in 2006.

To support the UK's transition to electric vehicles, all our planned new car parks will have a proportion of EV charging points. In addition, we will also install several visitor charging points in the existing car parks.

ENERGY EFFICIENCY IN OUR BUILDINGS

Opportunities are taken as part of ongoing maintenance to migrate to more efficient options (for example when lights reach end of life they are replaced by LEDs. A certain amount of funding is also allocated each year to uplifting refurbishment plans to achieve energy savings.

LONG-TERM SUSTAINABILITY GOALS

In June 2019 the UK has adopted a legally binding target to achieve net zero carbon emissions by 2050. Large campuses like ours can play a key role in helping to achieve this target. Therefore, UKAEA is working to create a long-term Sustainability Vision and Strategy for the Culham site and to define our pathway to a net zero future.

As part of this, we will:

In our 2050 vision we will agree and communicate the emission sources we will target for reduction (for example experiments, new and existing buildings and transport).

We will set interim sustainability targets for 2030 and 2040 and agree key metrics and milestones for monitoring progress. In addition to our commitment to reducing greenhouse gas emissions, these will include wider goals such as contributing to biodiversity and increasing climate change resilience. We will also define our approach for prioritisation of sustainability credentials, carbon offsetting and requirements for tenants.

GOVERNANCE AND DECISION MAKING

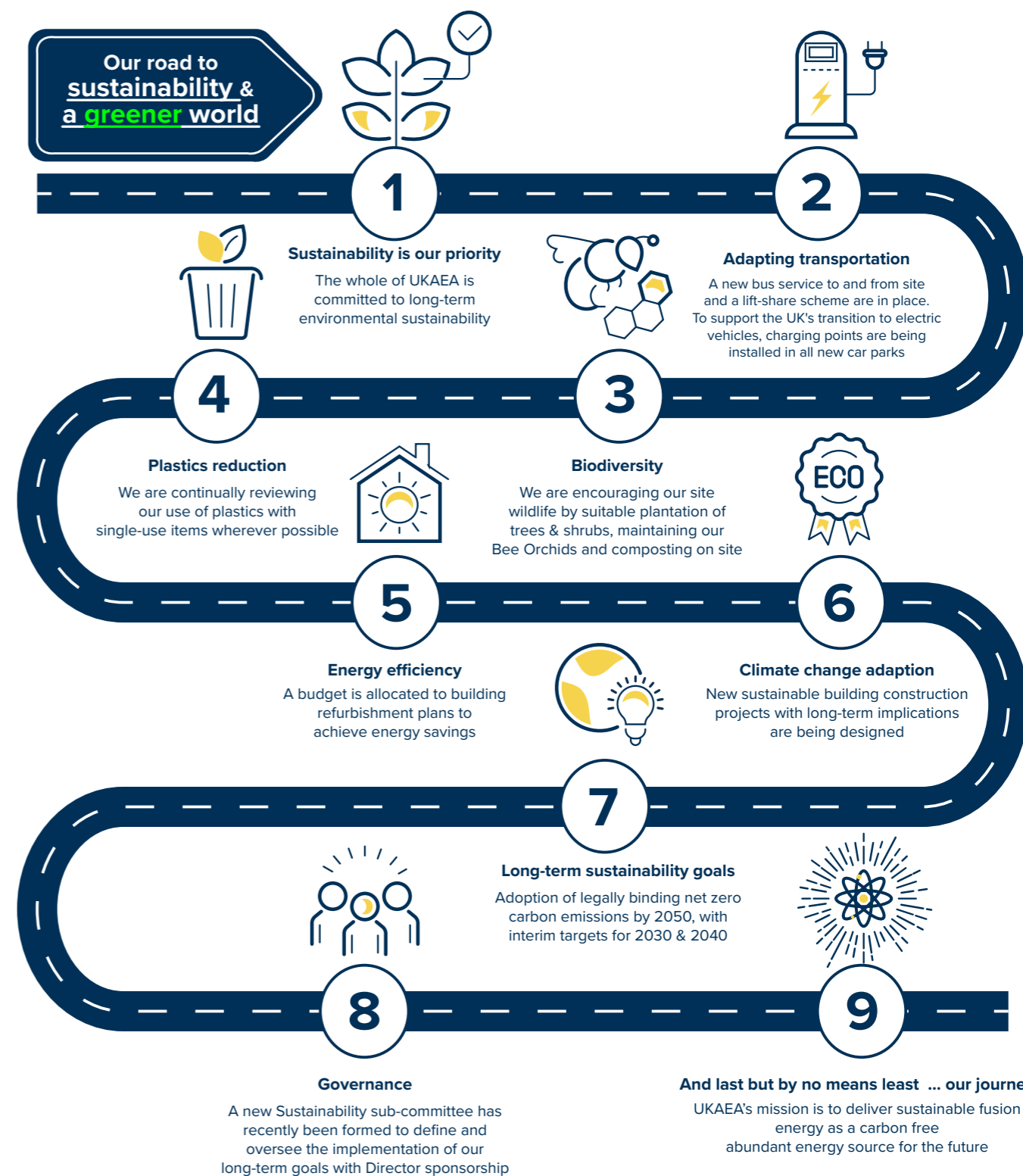
Sustainability projects are owned by the relevant teams across the organisation and are supported by the Environment Advisor. Projects are then reviewed quarterly as part of our Building and Estates Committee (BEC) which approves budgets and reviews progress. These aspects are also included at our Assurance Committee (ASC) which meets every 6 months and reviews overall compliance and long-term strategy. A separate Sustainability Sub-committee was recently formed to define and oversee the implementation of the long-term sustainability strategy that UKAEA is developing, as described above. Recommendations and aspects requiring higher-level decisions are presented to the Executive Committee.

STAFF LEARNING AND ENGAGEMENT

New staff are required to complete mandatory online training that covers environmental aspects. Staff are also required to undertake regular refreshers. All updates related to sustainability achievements and strategy are communicated through regular staff talks, through emails and the UKAEA intranet. Employees are encouraged to participate and submit their views through staff polls and an online suggestions box on the intranet. To further promote engagement an Environmental Forum has been established.

CONTINUOUS IMPROVEMENT

As part of the ISO14001 Certification, we are required to demonstrate that we consider our key environmental risks and opportunities and to show our commitment for continuous improvement in the areas where the impact is the greatest. Progress is reviewed periodically as part of internal and external audits and through an annual management review by the Executive Committee. Improvement actions are addressed as required and reviewed in subsequent audits.



PERFORMANCE REPORT

Summary of financial and non-financial sustainability information for 2019/20

Area		2016/17	2017/18	2018/19	2019/20
Greenhouse gas emissions (1,000 tCO ₂ e)		25.4	15.4	15.6	22.1
Estate Energy	Consumption (mill kWh)	59.9	36.1	49.8	77.8
	Expenditure (£k)	5,418	4,055	5,686	9345
Estate Waste	Amount (tonnes)	626.5	503.0	659.2	643.8
	Expenditure (£k)	190	345.5	370.5	319.1
Estate Water	Consumption ('000 m ³)	97.5	62.7	98	92.9
	Expenditure (£k)	165	144	279	206

Greenhouse gas emissions

Greenhouse gas emissions		2016/17	2017/18	2018/19	2019/20
Non-financial indicators (1,000 tCO ₂ e)	Total emissions (Scope 1-3)	25.4	15.4	15.6	22.1
	Gross emissions Scope 1 (direct)	1.67	1.45	1.2	1.3
	Gross emissions Scope 2 & 3 (indirect)	23.7	13.9	14.4	20.8
Related energy consumption (million kWh)	Electricity: Non-Renewable	52.7	29.8	44.7	72.0
	Electricity: Renewable	–	–	–	–
	Gas	7.24	6.33	5.01	5.8
	LPG	–	–	–	–
Financial indicators (£k)	Other	–	–	–	–
	Expenditure on Energy	5,418	4,055	5,686	9345
	CRC Licence expenditure	438	411	330	0
	Expenditure on accredited offsets	–	–	–	–
	Expenditure on official business travel	445	569	677	655

- Notes:
- The greenhouse gas emissions were calculated (from the raw data) using DEFRA/DECC conversion factors: <https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting>
 - Figures which have been partially or entirely estimated or revised are in bold italics. Explanations of each estimate follow:
 - CRC Licence Expenditure – The figure for 2018/19 has been revised. The CRC scheme ended in 2019, therefore no cost was incurred for this during 2019/20

PERFORMANCE REPORT

Waste Disposal

Waste		2016/17	2017/18	2018/19	2019/20	
Non-financial indicators (tonnes)	Total waste disposed of	626.50	503.00	659.20	643.79	
	Hazardous waste	Total	32.34	24.48	19.89	30.49
		Landfill	21.11	13.36	56.36	40.30
	Non-hazardous waste	Reused/Recycled	377.23	270.94	409.16	394.20
		Composted	39.32	37.36	33.84	36.72
		Incinerated (energy recovery)	99.5	100.1	99.0	102.3
		Incinerated (no energy recovery)	4.06	0.07	0.03	0.00
		Total non-hazardous waste	541.22	421.83	598.43	573.54
	Radioactive	Produced	39.44	40.94	50.05	49.81
		Disposed	52.92	56.73	40.88	39.76
	OSR (see note below)	Produced	10.18	36.49	9.81	25.63
		Incinerated (no energy recovery)	–	–	–	–
Total Radioactive / OSR waste disposed of		52.92	56.73	40.88	39.76	
Financial Indicators (£k)	Total disposal cost	190.0	345.5	370.5	319.1	
	Hazardous waste disposal cost		15.00	24.00	16.5	25.20
	Non-hazardous waste disposal costs	Landfill	10.0	2.0	4.0	16.5
		Reused/recycled	25	41	30	64
		Composted	3	2	1	2
		Incinerated (energy recovery)	20	21	20	24
		Incinerated (no energy recovery)	–	–	–	–
	Radioactive	Disposed	117	256	299	187
OSR	Incinerated (no energy recovery)	–	–	–	–	

Note:

- The figure for 'Compost' is food waste sent for anaerobic digestion. Negative financial figures for 'Reused/Recycled' reflect rebates received from scrap metals.
- Out of Scope of Regulations (OSR) waste is material where the activity is low enough to fall below the threshold set by the Environmental Permitting Regulations to be classified as radioactive waste.
- The 2018/19 expenditure figures for composted and radioactive waste have been revised.

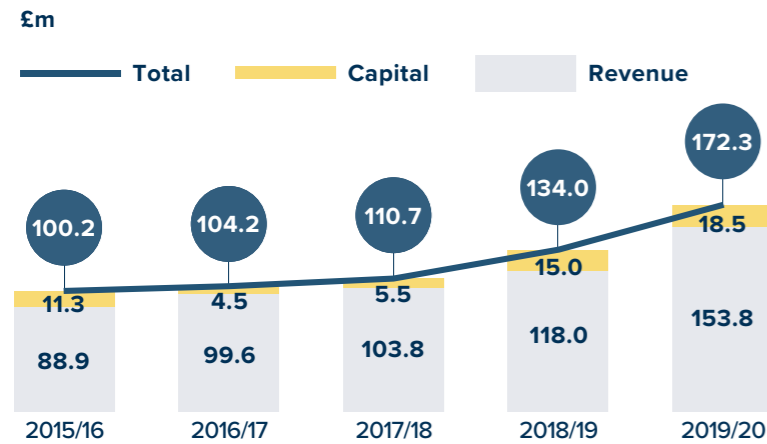
Finite Resource Consumption

Finite resource consumption		2016/17	2017/18	2018/19	2019/20	
Non-financial indicators ('000m ³)	Water consumption (whole site)	Supplied	97.52	62.7	97.95	92.89
		Abstracted	N/A	N/A	N/A	N/A
		Supply per FTE	0.09	0.06	0.08	0.06
	Average number FTE staff/contractors	1,046	1,130	1,249	1,461	
	A4 paper reams equivalent	4,300	4,800	5,200	9,200	
Financial indicators (£k)	Water supply costs (whole site)	165	144	279	206.3	
	Paper supply cost	8	7	8	12	

FINANCIAL REVIEW

Over the last 5 years, UKAEA has received an increase in funding for science and research, operational funding for the experimental fusion programmes and investment in facilities.

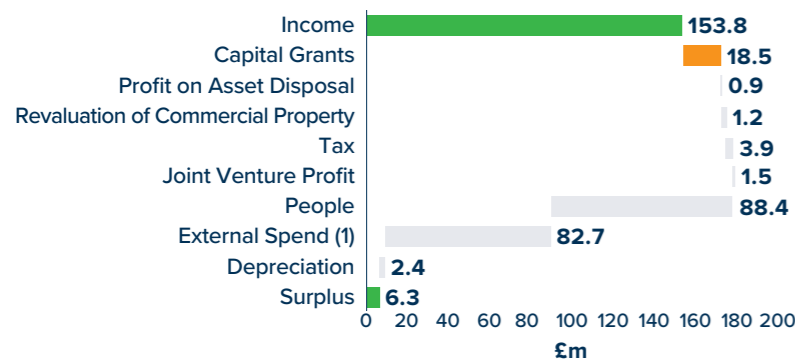
GROWTH IN FUNDING OVER THE LAST 5 YEARS



Total Income
Revenue and Capital
£172.3m 2019/20
+29% since prior year

This financial year, much of our funding has been Revenue Income to fund the operational costs and R&D expenditure plus some Capital Income (from BEIS and Capital Grants) to fund an increase in facilities (fixed assets). In 19/20 there was an overall surplus at a Group level of £6.3M.

Financial Performance 19/20



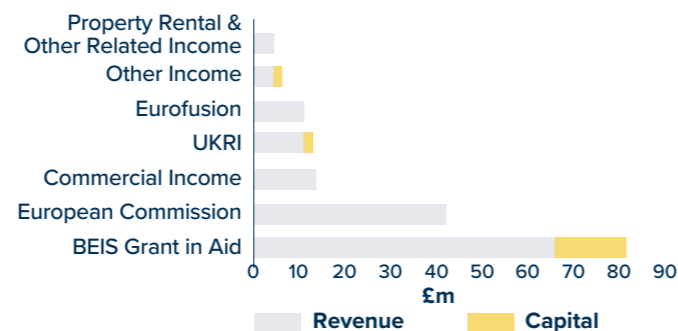
Overall Surplus of £6.3m

Note 1: External Spend refers to expenditure that is not Staff Costs, within the Statement of Comprehensive Income plus £2m of fixed asset expenditure which has been directly captured within the Statement of Financial Position.

SOURCE OF OUR INCOME

In the Financial received £172.3m with £153.8m as Revenue Income and £18.5m in respect of Capital. The majority of the income is from our sponsoring department – BEIS £82m. This is in respect of a series of major projects to develop the UK fusion capability – STEP, H3AT and Fusion Technology and UK contribution to the operation of the JET experiment in Culham, with this endeavour also funded by the European Commission at £42m. UKRI funds the ongoing underpinning Fusion scientific programme, as well as grants through Innovate to develop autonomous vehicle capabilities through RACE. Further information on key programmes is provided in the Performance Report.

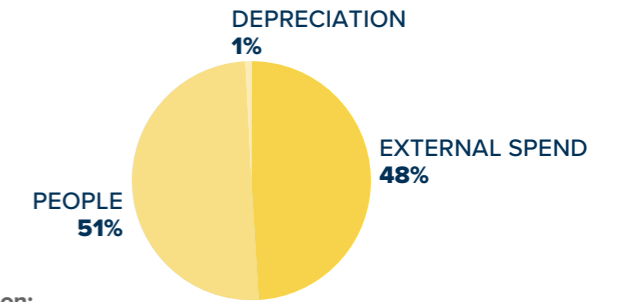
Source of our income 19/20



WHAT DO WE SPEND IT ON?

UKAEA spends most its income on people, both permanent staff and contingent labour. These are predominantly engineering and operations people who are operating our facilities. The depreciation is mainly in respect to the buildings on Culham site that are utilised by UKAEA. The balance of spend is external, encompassing utilities, plant and equipment, sites services and construction.

Summary % Spend Split 19/20



BALANCE SHEET HEADLINES

A key item on UKAEA Balance Sheet is the provision for Site Restoration:

UKAEA hosts the Joint European Torus (JET) facility at the Culham Centre for Fusion Energy (CCFE). The site restoration provision represents the estimated costs of decommissioning this facility and restoring the site upon which it sits. Due to the nature of fusion experiments, the fuel types used, and the advanced remote handling systems which will be used for decommissioning for the first time, this decommissioning project will be of great scientific and technical importance. It will also be subject to unique uncertainties and risks.

The JET Lifetime Plan is to conduct this decommissioning and restoration. It is compiled in collaboration with the Nuclear Decommissioning Authority (NDA). The NDA also cover the cost of maintenance of the plan. It contains three major activities:

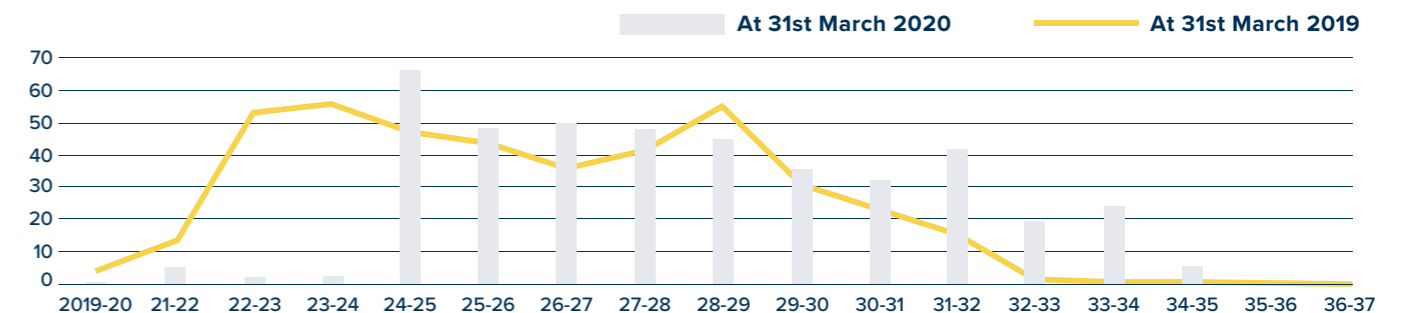
1. Decommissioning the JET experimental tokamak fusion machine
2. Storing, processing, and disposal of radioactive wastes
3. Demolishing structures, including buildings, and restoring the ground – once their use for decommissioning is complete.

The JET Lifetime Plan is set out as a costed project plan, current estimate is £425.5m.

The Department for Business, Energy and Industrial Strategy is the Sponsoring Department for UKAEA, they provide UKAEA with a Letter of Comfort that they will cover the cost of decommissioning, UKAEA therefore also recognise an opposing receivable. This provision is recognised by BEIS within their Annual Accounts.

The provision is reviewed annually, the below graph shows the comparison to last year, the key difference is the timing assumption for the start of decommissioning, based on the outlined scientific programme this is now assumed to be later, in 2024.

Decommissioning Spend Estimate - £m



THE ACCOUNTING OFFICER'S STATEMENT

Section 4(3) of the Atomic Energy Authority Act 1954 requires the United Kingdom Atomic Energy Authority to prepare a statement of accounts for each financial year in the form and on the basis set out by HM Treasury. The financial statements are prepared on an accruals basis and must give a true and fair view of the state of affairs of the Authority and of its income and expenditure, Changes in Taxpayers' Equity and Cash Flows for the financial year.

In preparing those financial statements, the Accounting Officer is required to comply with the requirements of the Government Financial Reporting Manual and in particular to:

- observe any additional guidance issued by HM Treasury, including the relevant accounting and disclosure requirements, and apply suitable accounting policies on a consistent basis
- make judgements and estimates on a reasonable basis
- state whether applicable accounting standards as set out in the Government Financial Reporting Manual have been followed, and disclose and explain any material departures in the financial statements and
- prepare the financial statements on a going concern basis.

The Accounting Officer of the Department for Business, Energy and Industrial Strategy (BEIS) has appointed the Chief Executive as Accounting Officer of the United Kingdom Atomic Energy Authority. The responsibilities of an Accounting Officer, including responsibility for the propriety and regularity of the public finances for which the Accounting Officer is answerable, for keeping proper records and for safeguarding the Authority's assets, are set out in Managing Public Money published by HM Treasury.

The Accounting Officer confirms that there is no relevant information of which the auditors are unaware and that they have taken all necessary steps to ensure they have been made aware of all relevant audit information throughout the business.

The Accounting Officer also confirms that she takes personal responsibility for the annual report and accounts and the judgements required for determining that they are fair, balanced and understandable.

DIRECTORS REPORT

The following items, required as part of the Directors' report, are included.

Composition of the UKAEA Board on page P57.

Disclosure of personal data-related incidents on page P73.

Future Outlook and Going Concern

UKAEA has a pipeline of major investment spanning the next 3-4 years. In particular, £86m National Fusion Technology Programme which is now in its 3rd year and expanding into a new location in Yorkshire, the £222m investment in STEP and more recently, £184m 'Fusion Foundations' investment to deliver the foundations necessary for a thriving fusion sector.

The commitment from international parties and the UK Government to fusion research remains strong. The UK Government is providing significant funding to deliver the expansion in programmes at UKAEA.

UKAEA's Statement of Financial Position includes liabilities of £477m for site restoration and historic restructuring costs. Matching reimbursement receivables are recognised for most of these liabilities on the basis of assurances from BEIS that it continues to accept responsibility in principle for these costs and provides for them in the BEIS departmental resource accounts. These assurances are re-confirmed annually and there is therefore no effect on UKAEA's ability to operate as a going concern. The financial statements have therefore been prepared on a going concern basis

The JET operating contract with the European Commission was temporarily suspended as of 1 April 2020, due to technical delay in the readiness for operations with tritium fuel. There is a plan in place for delivery of this milestone and UKAEA are working towards delivering this as quickly as possible. Further information on the key achievements, deliverables and scientific campaigns for JET Operations are contained within the Performance Report on P28.

I have reviewed all evidence provided to support the annual Governance Statement. My conclusion is that UKAEA's overall governance and internal control structures are generally sound and fit for purpose.



Professor Ian Chapman
Chief Executive and Accounting Officer
13th July 2020

GOVERNANCE STATEMENT

SCOPE OF RESPONSIBILITY AND PURPOSE OF THE GOVERNANCE STATEMENT

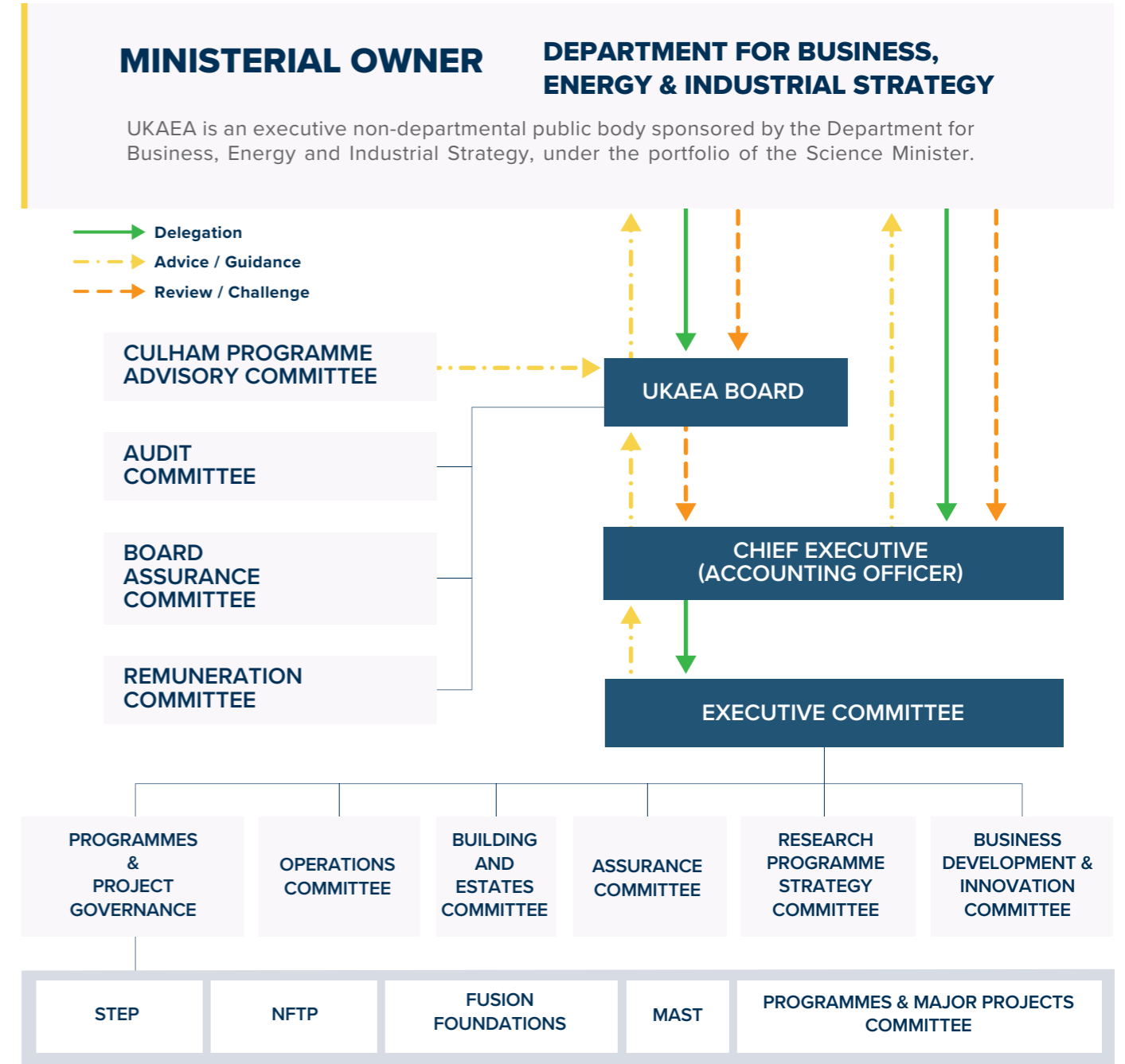
As Accounting Officer, I have responsibility for maintaining a sound system of governance and internal control that supports the achievement of the United Kingdom Atomic Energy Authority's policies, aims and objectives, whilst safeguarding the public funds and assets for which I am personally responsible, in accordance with the responsibilities assigned to me in Managing Public Money. I am assisted in this across the Authority (UKAEA) Group as a whole by the Chief Financial Officer and Director of Corporate Affairs.

The Governance Statement, for which I am personally responsible, sets out how I have discharged my responsibility to manage and control UKAEA's resources during the year. It also sets out the governance framework and control structure of UKAEA, its stewardship and corporate governance, and the framework for and effectiveness of the risk management process in place.

CORPORATE STRUCTURE

The UKAEA Group has 50% control of a joint Public Sector Limited Partnership (HSIC PubSP), the public-sector partner in Harwell Science and Innovation Campus Ltd Partnership (HSIC), which is responsible for the development of the Harwell Campus. Both HSIC PubSP and HSIC have appropriate and fully documented governance arrangements in place, covering such matters as membership of, and decisions made by, their Boards of Directors, appointment and removal of Directors, funding and confidentiality. Our CFO and Director of Corporate Affairs is on the Board of HSIC PubSP and our CTO and Director of Strategy, Communications and Business Development is on the Boards of both HSIC PubSP and HSIC. UKAEA's subsidiary, AEA Insurance Ltd, has appropriate governance arrangements in place. These are formally reviewed and updated as necessary by its Board of Directors, which includes UKAEA's Director of Finance. A compliance and company secretarial summary is tabled for review at each Board meeting. A risk register and provisions for an annual internal audit of controls and risks are also in place.

GOVERNANCE MODEL



The membership and purpose of the Board, Executive Committee, and sub-committees is outlined in the following pages.



MRF hot cells ready to receive material samples

UKAEA BOARD

The Board

The United Kingdom Atomic Energy Authority is controlled through its Board of Directors, who are appointed by the Secretary of State of BEIS. The Board's main role is to establish UKAEA's vision, mission and values, set strategy and structure, and exercise accountability to UKAEA's stakeholders.

The division of responsibilities between the Chair of the Board and the Chief Executive is clearly defined and has been approved by the Board.

The role of the Chair

The Chair leads the Board in the determination of its strategy and in monitoring the achievement of its objectives. On 1 August 2018, Professor David Gann was appointed the Chair of UKAEA.

Board Committees

There are a number of committees which operate in support of the Executive Committee and the Board. As all Non-Executive Directors are appointed by BEIS, UKAEA does not have a Nominations Committee.

The role of the Chief Executive

The Chief Executive is also UKAEA Accounting Officer, appointed by BEIS. The CEO has direct charge of UKAEA on a day-to-day basis and is accountable to the Board and to Parliament for the financial and operational performance of UKAEA and its subsidiaries and for the stewardship of resources.

His responsibilities are set out in a letter from the BEIS Permanent Secretary and the accompanying Accounting Officer Memorandum.

Executive Committee

The CEO leads the Executive Committee, comprising key managers from within the organisation who assist leading UKAEA.



**Professor David Gann CBE
Chair**

Appointed as chair of the UKAEA Board on 1 August 2018. David is Professor of Innovation and Technology Management at Imperial College Business School. Between 2013-2019, he was Imperial College's Vice President – Innovation, playing a central role in developing the new White City campus and in securing major new corporate collaboration and investment. He is a member of the Secretary of State for Health's Technology Advisory Board, a Non-Executive board member of Directa Plus plc the world's largest producer of pristine graphene, and advisor to NEC, the Japanese electronics firm. He has advised several global technology companies including Citigroup, Gammon, IBM, McLaren and Tata Group, developed Crossrail's Innovation Strategy and mentored numerous technology start-up businesses.

He was Chairman of the Smart London Board (2012-2017), responsible for London's digital strategy, reporting to the Mayor of London and previously Group Innovation Executive, Laing O'Rourke plc (2007-2011).

He is the author of 8 books on innovation, entrepreneurship and technology management, which have been published in 8 languages. He is a Fellow of the Institution of Civil Engineers, an Honorary Fellow of the Royal College of Art and a Fellow of the City & Guilds Institute.



**Norman Harrison
Non-Executive**

Appointed to the UKAEA board in March 2016, Norman finished his term in February 2020. He is currently the Deputy Chair of the Advisory Council to RWM Ltd and the Deputy Chair of the Board of Governors at Manchester Metropolitan University. He also runs his own consultancy business.

He has 35 years' experience in the power and nuclear power sector. He has a long track record of successfully running nuclear power stations including Heysham 1 and Sizewell B. He delivered a major change programme at Dounreay and was CEO of UKAEA from 2006 to 2010 and led on the privatisation programme for UKAEA.

Norman is a Chartered Chemist and holds Fellowships with Nuclear Institute, Royal Society of Chemistry and Royal Society of Arts.

ACCOUNTABILITY REPORT



Shrinivas Honap
Non-Executive

Appointed to the UKAEA Board on 1 April 2018, Shrinivas took over the position as Chair of the UKAEA Audit and Risk Committee, which oversaw the production of this document. Previously he has held senior roles at Vodafone and Capita and as a non-executive within the NHS. He brings a wealth of experience focused particularly on major system development, customer management, regulation and finance.

He currently holds non-executive roles in the following organisations: Registers of Scotland; Lay Member of the Speakers Committee on IPSA; Driver and Vehicle Standards Authority; Office of the Public Guardian; Legal Ombudsman and UK Low Level Waste Repository Limited. He is also Chair of the Audit Committee for the latter three organisations. He is also panel Member of CMA.



Sue Scane
Non-Executive

Appointed to the UKAEA Board on 1 April 2018. Sue was the Director for Environment & Economy at Oxfordshire County Council until her retirement, having previously been their Assistant Chief Executive & Chief Finance Officer. She is a qualified Accountant and has worked in Local or Central Government throughout her career.

She also serves on Boards of Civil Nuclear Police Authority, Oxford Diocese and Didcot First.



Professor Sir Adrian Smith, FRS
Non-Executive

Appointed to the UKAEA Board on 1 April 2018. Adrian Smith joined The Alan Turing Institute in September 2018. His previous role was Vice-Chancellor of the University of London where he was in post from 2012. He was Director General, Knowledge and Innovation in BIS (now BEIS) between 2008-2012.

He has worked with the UK Higher Education Funding and Research Councils and was appointed Deputy Chair of the UK Statistics Authority from September 2012. In 2014, he was appointed Chair of the Board of the Diamond Synchrotron at Harwell.

He is a past President of the Royal Statistical Society and was elected a Fellow of the Royal Society in 2001 in recognition of his contribution to statistics. In 2003-04, he undertook an inquiry into Post-14 Mathematics Education for the UK Secretary of State for Education and Skills and in 2017, on behalf of Her Majesty's Treasury and the Department for Education, published a 16-18 Maths Review.

In 2006 he completed a report for the UK Home Secretary on the issue of public trust in Crime Statistics. He received a knighthood in the 2011 New Year Honours list.

ACCOUNTABILITY REPORT



Chris Theobald
Non-Executive

Appointed to the UKAEA Board on 1 March 2016. He is a senior executive from the nuclear, energy and defence markets. During the last 15 years he has held leadership roles including Managing Director of Serco's nuclear consulting business and Divisional MD at a joint venture between BAE Systems and Finmeccanica. Previously he held senior roles in BAE Systems Avionics and GEC-Marconi. He led the £140m sale of Serco's nuclear consulting business to AMEC in 2012. He served as a Board Director for the UK Low Level Waste Repository at Drigg, Cumbria and was a founding member of the board for the National Skills Academy for Nuclear. He was recently Vice-President UK/Europe for BWXT Inc (formerly Babcock and Wilcox) leading business development in the civil nuclear market.

Chris has a degree in Aeronautical Engineering and is a Member of the Royal College for Defence Studies.



Professor Ian Chapman
Executive

Appointed Chief Executive Officer and Accounting Officer for the UKAEA on 1 October 2016. Ian joined UKAEA in 2004, becoming Head of Tokamak Science in 2014. He has held several international roles in fusion and published over 200 journal papers.

He has won a number of international awards, including the Royal Society Kavli Medal in 2020, the American Physical Society Thomas Stix Award in 2017, the Rosalind Franklin Award Lecture in 2015, the European Physical Society Early Career Prize in 2014 and the Institute of Physics Paterson Medal in 2013.

He was made a Fellow of the Institute of Physics in 2013 and became a visiting Professor at Durham University in 2015.



Antonia Jenkinson
Executive

Appointed Chief Financial Officer & Director of Corporate Affairs on 11 February 2019, and a member of the UKAEA Board on 6 June 2019. Antonia was previously CFO of Roc Technologies Ltd, a BGF backed business, where she completed the acquisition of Esteem Systems Ltd. Prior to ROC, she was CFO/COO of the Satellite Applications Catapult where she helped grow the company from start-up. Antonia was CFO of the Wyevale retail group where she refinanced the £270m multi-site business after debt and credit issues in 2008 and led the sale of the business to Terra Firma in 2012. Antonia started her career at Accenture and in corporate finance at Apax Partners.

Alongside her executive roles, Antonia has been a Non-Executive Director and Chair of the Audit Committees of Garden Centre Property Development Trading plc, Ocean Safety Ltd and Vysion Limited. She won the Sunday Times NED Award for a private equity backed business in 2015.

Antonia is a fellow of the Chartered Institute for Securities & Investment.

BOARD REPORT

Overview and key duties

The Board, which met five times during the year, has a schedule of matters reserved for its approval. This includes: establishing the overall strategic direction of UKAEA within the policy and resources framework agreed with the responsible Government Minister; reviewing UKAEA'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; reviewing corporate risks, and reviewing the safety, environmental and security performance of UKAEA.

The Board delegates responsibility for day-to-day and business management control to the Chief Executive who is assisted by key senior managers comprising the Executive Committee. The Executive Committee meets monthly. Specific responsibilities delegated to the Executive Committee include development of UKAEA performance measures; implementation of the strategies and policies as determined by the Board; monitoring of the operating and financial results against plans and budgets; developing and implementing risk management systems and reviewing progress on major projects.

Board Composition

Non-Executive Director		Executive Directors	
Professor David Gann, CBE	Chair	Professor Ian Chapman	Chief Executive Officer (Accounting Officer)
Sue Scane		Antonia Jenkinson	Chief Financial Officer and Director of Corporate Affairs
Professor Sir Adrian Smith FRS			
Chris Theobald			
Shrinivas Honap			
Norman Harrison	Ended February 2020	Board Attendee	
		Lynne Maclean, MBE	Chief Operating Officer
Lady Eithne Birt	From May 2020	Tim Bestwick	Chief Technology Officer
Dr Luc Bardin	From May 2020	BEIS	Representative from Sponsoring Department
Dr Mark Bayley	From May 2020		
Stephen Barter	From May 2020	Independent Board Advisor	
		Norman Harrison	From March 2020
		Jim Hutchins	Ended January 2020

The Chief Financial Officer and Director of Corporate Affairs joined the Board in June 2019. From then to 29th February 2020, the Board comprised the Chair, two Executive Directors and five independent Non-Executive Directors. At this date one of the independent Non-Executive Directors came to the end of their term of office, they were retained as a Board Advisor. Four new independent Non-Executive Directors joined the Board in May 2020. The composition of the UKAEA Board is in line with other bodies that report to BEIS.

The Directors' biographical details included in the Directors' Report show that the other members of the Committee brought to it a wide range of experience from positions at the highest level in the UK scientific and business community.

A list of Board members and their biographical details is included on P57.

Attendance

Professor David Gann, CBE	5 (5)	Chair
Sue Scane	5 (5)	Non-Executive Director
Professor Sir Adrian Smith FRS	2 (5)	Non-Executive Director
Chris Theobald	5 (5)	Non-Executive Director
Shrinivas Honap	4 (5)	Non-Executive Director
Norman Harrison	4 (4)	Non-Executive Director
Norman Harrison	1 (1)	Independent Board Advisor
Professor Ian Chapman	5 (5)	Chief Executive Officer (Accounting Officer)
Antonia Jenkinson	5 (5)	Chief Financial Officer and Director of Corporate Affairs
Lynne Maclean, MBE	4 (5)	Chief Operating Officer
Tim Bestwick	1 (1)	Chief Technology Officer
Jim Hutchins	4 (4)	Independent Board Advisor
BEIS	5 (5)	Representative from Sponsoring Department

Directors' independence

The Non-Executive Directors constructively challenge and help develop proposals on strategy, and bring strong and independent judgement, knowledge and experience to the Board's deliberations. The independent Directors are of sufficient calibre and number that their views carry significant weight in the Board's decision making.

The Board considers all its Non-Executive Directors to be independent in character and judgement.

No Non-Executive Director:

- has been an employee of UKAEA within the last five years;
- has, or has had within the last three years, a material business relationship with UKAEA or its former or current subsidiaries;
- receives remuneration from the Authority other than a Director's fee and expenses incurred in carrying out their duties;
- has close family ties with any of UKAEA's advisers, Directors or senior employees;
- holds cross-directorships or has significant links with other Directors through involvement in other companies or bodies; or
- has served on the Board for more than nine years.

Compliance with the Corporate Governance Code

UKAEA's corporate governance arrangements are kept under review to ensure that they are compliant, where applicable, with the provisions of corporate governance in central government departments: Code of Good Practise April 2017.

Evaluation of Board Performance

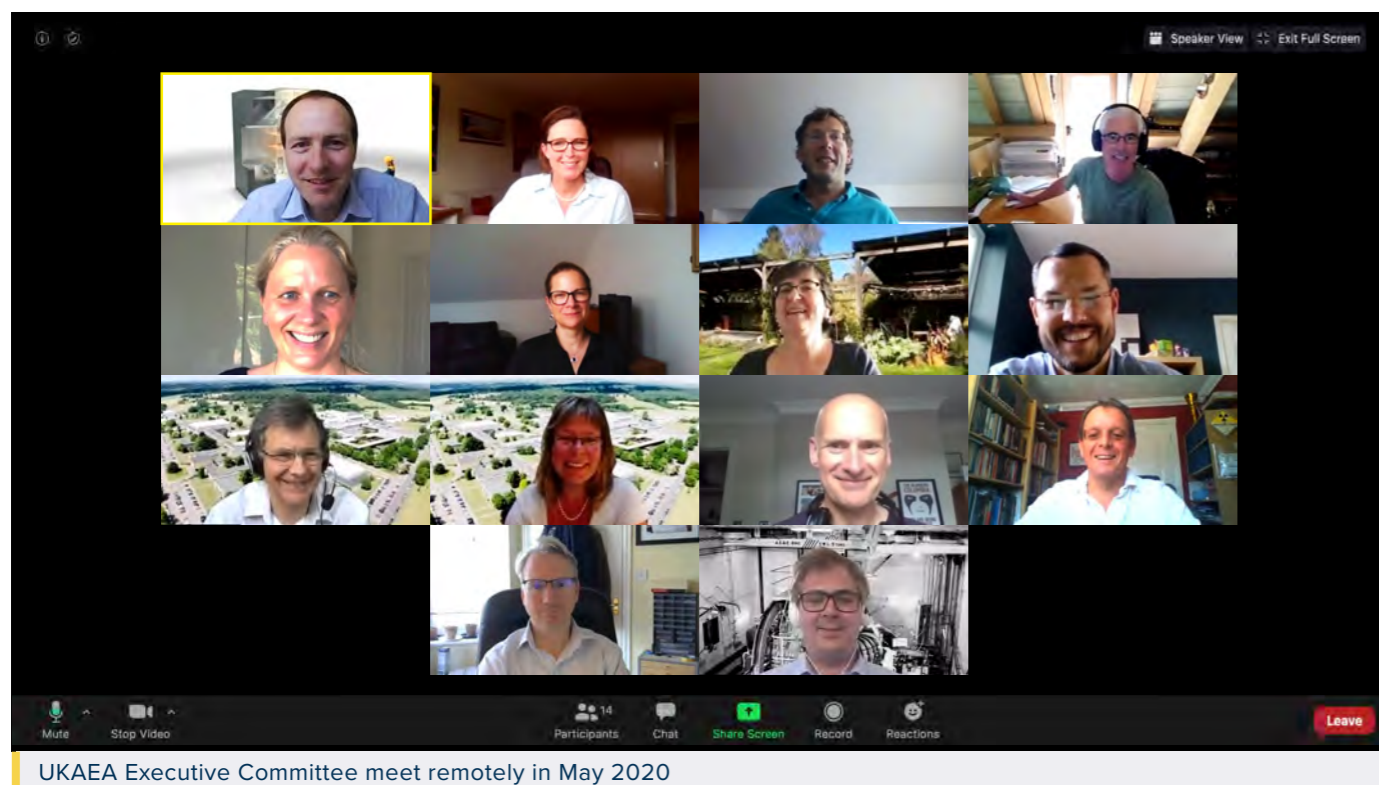
A full Board effectiveness review was planned in the year, with the decision that it should be conducted following recruitment of four new Non-Executive Directors. This recruitment was delayed by the external political landscape. With new appointments in place as of May 2020, a full board effectiveness review including a review of sub-committees is now ongoing at the time of writing.

The Board reviews the performance of its sub-committees on an annual basis, using a self-assessment process.

External Review

In addition to the Board sub-committees, external advice is a key element of the Corporate Governance process. The Culham Programme Advisory Committee, which has an external chair and membership, all of whom have backgrounds in fusion and industry, provides expert external scrutiny of UKAEA programmes and strategy, and reports directly to the Board. The key role of the committee is to review the UKAEA scientific programme and provide guidance and advice to the Executive on the implementation and planning for these, as well as independent assurance to the Board that the whole UKAEA programme is soundly based and achievable.

UKAEA EXECUTIVE COMMITTEE



UKAEA Executive Committee meet remotely in May 2020

The members of the UKAEA Executive Committee are (from left to right):

Professor Ian Chapman – Chief Executive Officer and Accounting Officer

See page 59 for Ian Chapman's bio.

Antonia Jenkinson - Chief Financial Officer & Director of Corporate Affairs

See page 59 for Antonia Jenkinson's bio.

Dr Tim Bestwick – CTO and Director of Strategy, Communications and Business Development

Tim joined UKAEA in 2018. He has a PhD in engineering. Previously he led commercialisation and innovation at the Science and Technology Facilities Council and the successful development of the major research and innovation campuses at Harwell and Daresbury. He has led tech start-ups such as Kamelian Ltd and Bookham Technology Ltd, beforehand having worked for Sharp and IBM. Tim was recently Chair of the Eureka Network, an intergovernmental organisation for pan-European research and development funding and coordination.

Professor Rob Buckingham – Director of RACE

Rob joined UKAEA in 2014. He is the first Head of RACE. Previously, Rob was co-founder and Managing Director of OC Robotics which developed and commercialised snake-arm™ robots. Rob was lead-author of the UK's Robotics and Autonomous Systems 2020 Strategy and is a member of the UK Robotics Growth Partnership. He is a visiting Professor to the University of Manchester Department of Electrical and Electronic Engineering, Fellow of the Royal Academy of Engineering and a Fellow of the Institute of Engineering and Technology.

Alli Brown – Director of Finance and Business Systems

Alli joined UKAEA in 2017. She is a member of the Chartered Institute of Management Accountants. Alli has broad senior experience across different sectors including scientific research, manufacturing and telecoms. Her role encompasses all aspects of finance with overall responsibility for the core business system enabling HR/Procurement and Finance. She is a UKAEA appointed Board member for AEAIL, a subsidiary captive insurance company. Alli is also a member of the UK Space Agency Steering Board and Audit Committee.

Gill Lay – Head of People

Gill joined UKAEA in 2018. She is a Chartered Member CIPD. Gill is responsible for all people services including talent acquisition and development, employee relations, organisational development, strategic partnering, design, pay and reward. She has worked in both private and public sectors and is committed to ensuring HR adds value to organisations.

Lyanne Maclean – COO

Lyanne joined UKAEA in June 2019. She was a British Army Officer until 2013, leaving as a Colonel, having commanded her Regiment and led soldiers on operations worldwide. She also held a variety of senior planning and policy roles in the MoD, NATO and the UN, Joint and Army HQs. She worked for Royal Mail in two senior leadership roles in Operations and established Royal Mail's LGBT+ Network. Lyanne is an MBE and was awarded a Queen's Commendation for Valuable Service.

Dr Joe Milnes – JOC Senior Manager & JET Operations Department Manager

Joe joined UKAEA in 2000. He has a PhD in Thermal-Hydraulic Modelling from Cranfield University. Joe has held a variety of design, project and management roles across JET, MAST-U and ITER and is currently JET Operating Contract (JOC) Senior Manager. As well as leading UKAEA's delivery of the JOC, he also chairs and advises design and project reviews of fusion facilities around the world.

Dr William Morris – Chief Scientist

William joined UKAEA in 1987 after a spell at Princeton. He has a PhD in Tokamak Science. Originally a Tokamak plasma physicist, he headed the experimental Tokamak programme at Culham and the department of plasma researchers (including JET). William has provided scientific and strategic advice to the European programme since the 1990s expanding from plasma science to the full spectrum of science and technology. He was the inaugural chair of the EUROfusion Science and Technology Advisory Committee (STAC) from 2014-2018, is an author and co-editor of the European Fusion Roadmap and is a member of the DEMO Technology Advisory Group.

Kay Nicholson – Head of Assurance

Kay joined UKAEA in 2014. She is a chartered member of the Institute of Occupational Safety and Health and has worked in a range of manufacturing industries, the maritime defence sector in the UK and internationally as well as the automotive industry. Her role encompasses quality, SHE, audit, enterprise risk management and business resilience. Kay has led on cultural change programmes with particular emphasis on improving assurance processes. She is also a UKAEA appointed board member of RADSAFE CLG.

Chris Waldon – STEP Delivery Director

Chris joined UKAEA in 2008. He has over twenty-five years of experience spanning the nuclear, pharmaceutical, chemical, refining and power generation sectors in both industrial and publicly funded research settings. Chris has led significant multi-disciplinary teams in the delivery of new projects, in both programmes and services. He is the Founder of the Central Engineering Department and Authority Chief Engineer (2008-2019) and a member of the EUROfusion PPP&T (DEMO) Technical Advisory Group. He is a contributing author for the EU Research Roadmap to the realisation of Fusion Energy.

Colin Walters – Director of Fusion Technology (to April 2020)

Colin joined UKAEA in 2018. Having studied Physics and Materials Science at Liverpool University, Colin enjoyed 18 years with BNFL at Sellafield during which time he undertook several roles including leading major research programmes on decommissioning and advanced reprocessing. In 1999 he joined TWI to oversee the design, construction and commissioning of a number of technology facilities including the new headquarters near Cambridge. Additionally, utilising his knowledge of the nuclear industry, Colin undertook a business development role and went on to manage the development of TWI's Executive Lead for ED&I development. Colin retired in May 2020.

Stephen Wheeler – Director of Fusion Technology (From April 2020)

Stephen joined UKAEA in 2015 and was appointed Director of Fusion Technology in April 2020. He read Mechanical Engineering at Imperial College. Stephen started his career as a design engineer, working in product innovation in a number of industries including medical devices, white goods and oil and gas sectors. After moving into operations management, he has built and managed advanced manufacturing facilities across international locations. He successfully established the RACE business unit at UKAEA and grew the team from 45 to 180 over a five-year period.

Professor Howard Wilson – STEP Programme Director (to June 2020)

Howard has been seconded to UKAEA, part-time, since 2017 initially as Research Programme Director and then, since 2019, as Director of the STEP Programme. He is Professor of Plasma Physics at the University of York, where he established the York Plasma Institute within the Department of Physics. A theoretical plasma physicist, his roles there include Director of the Fusion Centre for Doctoral Training and Principal Investigator for a large EPSRC Programme Grant on plasma turbulence. Howard ended his term on the Executive Committee in March 2020 and stepped down from as a Director of STEP at the end of May 2020.

Secretariat**Dr Nick Walkden - Executive Officer to the CEO**

Nick joined UKAEA in 2010. He originally joined as a placement student, before returning in 2011 as a PhD student with the University of York. Nick has had a successful research career, leading research at home and overseas. He was recently awarded the inaugural Malcolm Haines Prize for early career research by the Institute of Physics. Nick transferred to the corporate side of the business in early 2020, and he is secretary for Board and Executive meetings.



CEO Ian Chapman and RACE Director, Rob Buckingham show Science Minister Amanda Solloway MP around UKAEA facilities

EXECUTIVE COMMITTEE REPORT

Overview and key duties

Meeting 12 times this year, our Executive Committee delivers the strategic direction of our business on behalf of the Board. It brings together all aspects of our business and seeks to embed our delivery culture at the highest level of our decision-making. The Executive Committee analyses material issues of strategic risk and opportunities for the organisation, alongside generating recommendations for the Corporate Strategy and ensuring that business plans are aligned to our strategic objectives. It reports on the delivery of the Corporate Strategy to the Board.

The Executive Committee is chaired by the CEO and considers all matters within its terms of reference, including: – the business plans and budgets for 2019/20 and our three-year time horizon – strategic risk and material issues – UKAEA financial and non-financial performance – information security, privacy and procurement – health and safety and sustainability – people, culture, customer, governance and EDI.

Specific responsibilities delegated to the Executive Committee from the UKAEA Board include development of UKAEA performance measures; implementation of the strategies and policies as determined by the Board; monitoring of the operating and financial results against plans and budgets; developing and implementing risk management systems and reviewing progress on major projects.

The Executive Committee has six sub-committees that report into it and cover the breadth of the business:

- **Research Programme Strategy Committee** responsible for proposing strategy for UKAEA's research programmes for approval at Executive Committee and managing the implementation of the agreed programme
- **Operations Committee** responsible for ensuring that the operational activities of UKAEA meet its requirements
- **Programmes and Major Projects Committee** responsible for reviewing the status of Programme areas and Business Units
- **Business Development and Innovation Committee** responsible for proposing strategy for investment in business development activities for approval at Executive Committee and managing the implementation of the agreed business development investment
- **Asset Management and Investment Committee** is responsible for the investment in, and management of, property assets and proposing property strategy to the Executive Committee (renamed Building and Estates Committee in May 2020, reflecting its focus on the campus, buildings and site services)
- **Assurance Committee** is responsible for assuring the Executive and Board that the activities of UKAEA are performing in a compliant and prudent manner and that there are sound systems of internal control which identify areas for improvement.

BOARD COMMITTEE REPORTS

AUDIT COMMITTEE REPORT

Overview

The Audit Committee met five times during the year. All its members are independent Non-Executive Directors. The Committee plays a crucial role in oversight and scrutiny of our internal control environment, financial reporting and approach to risk. In 19/20, all Non-Executive Directors were members of the Audit Committee.

Composition of the Audit Committee

For the year to 31st March 2020, the Committee had at least one member possessing what the Smith Report and HMT's Audit Committee Handbook describe as recent and relevant financial experience; Shrinivas Honap Committee Chair (appointed April 2018), is a qualified Chartered Accountant and holds a number of roles as Chair of Audit across government having previously been an executive at Vodafone and Capita Plc.

The Audit Committee is committed to discharging its key role with transparency and objectivity. In support of this, in addition to the members, the following groups are also invited to attend the Audit Committee: –

UKAEA: Chief Executive, Chief Financial Officer, Finance Director (Counter Fraud Executive Lead), Head of Internal Audit, Head of Financial Accounts and Head of Assurance

National Audit Office (NAO): representatives of NAO audit team.

As our external auditor, the NAO are given complete access to all financial and other information and the Committee meets (without management present) with the NAO. In addition, the Audit Committee Chair meets with the Head of Internal Audit on a regular basis.

Attendance

Shrinivas Honap	4 (4)	Chair
Sue Scane	3 (4)	Non-Executive Director
Professor Sir Adrian Smith FRS	2 (4)	Non-Executive Director
Chris Theobald	4 (4)	Non-Executive Director
Norman Harrison	3 (3)	Non-Executive Director
Norman Harrison	1 (1)	Independent Board Advisor
Professor Ian Chapman	4 (4)	Accounting Officer - Chief Executive Officer
Antonia Jenkinson	4 (4)	Chief Financial Officer and Director of Corporate Affairs
Allison Brown	4 (4)	Executive Team Member - Finance Director
Kay Nicholson	4 (4)	Executive Team Member - Head of Assurance
Head of Internal Audit	4 (4)	
NAO	4 (4)	
BEIS	2 (2)	

Under its terms of reference, the Committee is responsible for:

- monitoring the effectiveness of the external audit process and overseeing the terms of engagement and remuneration of the external auditor and their work;
- endorsing UKAEA's policy on the provision of non-audit services by the external auditor (none were provided in 2019/20);
- reviewing annually the system of internal control and the processes for monitoring and evaluating the risks facing UKAEA;
- agreeing, monitoring and reviewing the effectiveness of the internal audit programme and the implementation of recommendations arising from it;
- reviewing the actions and judgements of management in relation to annual and other financial statements before submission to the UKAEA Board; and
- reviewing UKAEA's procedures for detecting and preventing fraud and its whistleblowing policy.

ACCOUNTABILITY REPORT

Key areas considered by the Audit Committee during the year were:

- workplan of internal audit, the results of such audit work and management’s progress to resolve issues and risks identified and key areas of focus for Internal Audit;
- the 3-year internal audit and management systems audit programmes and mapping of these audits to the Corporate Risk Register;
- fraud landscape, UKAEA counter fraud strategy and annual action plan, progress on the implementation of the Government Functional Standard 013 – Counter fraud, bribery and corruption;
- review of the lifetime plan which underpins the site restoration provision;
- review of information security policy and procedures; and
- UKAEA’s statutory accounts, including compliance with HMT guidance and the application of accounting policies and assumptions.

CHAIRS REPORT



Shrinivas Honap

“Over the last year the Executive Team has made a significant improvement in its management of risks identified through the integrated risk framework. Specifically, monitoring of actions resultant from assurance activity, continued focus on re assessing risk in the context of changing external factors, identifying new risks and supporting their management.

Whilst there are continued challenges in improving cyber security, business continuity planning, technical debt and management of its integrated payroll systems these risks are being mitigated through credible plans. It also needs to consider fully protection of its intellectual property on an ongoing basis.

The moderate rating given by Head of Internal Audit is therefore fully appropriate in that some improvements to risk management are still required.

It is vital that this focus is not lost over the coming year given the context of the COVID-19 crisis and planning for the end of the EU transitional arrangements”.

Risk Management

An integrated system of risk management is in place across the organisation, see P18 for further detail and a summary of the key risks facing UKAEA.

Internal Audit

UKAEA has an internal audit function which operates in accordance with Public Sector Internal Audit Standards and an Audit Charter approved by the Audit Committee. The work of Internal Audit is determined by analysis of the risks to which UKAEA is exposed. The annual internal audit programme is based on this analysis and additionally includes a 3-year rolling programme to test key financial controls. (See Assurance on P16). This programme covers of the management of risks and information from across the organisation. The Head of Internal Audit provides the Audit Committee with regular reports on programme progress.

Audit Days 2019/20



ACCOUNTABILITY REPORT

Internal Audit Annual Opinion

The Head of Internal Audit has given moderate assurance over the adequacy and effectiveness of UKAEA’s systems of governance, risk management and internal control. The control weaknesses identified in the Purchase to Pay Audit which resulted in a Limited Assurance opinion have been addressed by management.

Audit Results

Internal audits undertaken during the year took into account an assessment of where the greatest control risks were, and this approach resulted in the following classifications:

In the previous year, 70% of audit attained a Moderate Assurance rating, this year this has improved to 93%.

Classification	Number of reports
Substantial Assurance	0
Moderate Assurance	13
Limited Assurance	1
Unsatisfactory	

The limited assurance report referred to Purchase to Pay process and the key reason for the rating was a gap in the documentation and clarity on segregation of duty controls within the procurement system in respect to setting up a supplier, although no actual system gap was identified. All recommendations were completed and there are no outstanding actions for this audit.

The following table summarises progress during the year on completing recommendations and actions arising from Internal Audit reviews. Of the completed actions, 77% were completed on time – this remains an area that the management team are focussed on improving.

Audit actions	No. of actions	Completed	Outstanding @ 31st March 2020	
			In Progress	Overdue
Brought forward from 2017/18	2	1		1
Brought forward from 2018/19	9	8	1	
Raised in this year	35	32	1	2
Total	46	41	2	3
Carried forward				5

Overdue Actions:

Payroll interface

The process to automate the information flow to our external payroll provider has been challenging and that has led to delays. A parallel run is in place from June 2020, so this is now back on track, with the improvements to the payroll control environment now able to be realised.

HR Recruitment Strategy (2 actions)

The outstanding HR audit actions in relation to the Recruitment and other People strategies were delayed slightly by the global COVID-19 pandemic and were completed by 18 May.

OTHER CONTROL AND GOVERNANCE STRUCTURES

Decommissioning Provision Review

UKAEA and the Nuclear Decommissioning Authority have completed a review of the Lifetime Plan which underpins the Decommissioning Provision, the impact of which is included within the Financial Statements (see note 20a). This has followed the principles set out in “The Aqua Book”, a good practice guide published by the UK Government for assurance of financial analysis. Further explanation as to the key components and scope of the life-time plan is within the section on Financial Performance.

Whistleblowing policy

UKAEA has a detailed whistleblowing policy which is available to all employees through the Intranet. It is regularly reviewed and refreshed and is written in a way that encourages employees to report concerns, and makes it clear who the key contacts are. No concerns have been reported during the financial year.

Conflict of Interest

UKAEA has a detailed conflict of interest policy. Board member and Executive Committee are required to complete an annual declaration, meeting Chairs request confirmation of any conflict at the commencement of Board meetings, involvement in any tender exercise will require a declaration to be made which is assessed by the Head of Procurement.

Alexander Tax Review

I confirm that the UKAEA is compliant with the requirements of the Alexander Review (2012). We have one Senior Staff member on secondment and have confirmed that they are paid via the payroll of their seconding organisation. All other Senior Staff and Non-Executive Members are paid via UKAEA payroll. In all cases, this results in appropriate tax contributions being deducted at source. During the year under review, UKAEA reviewed the tax arrangements of its off-payroll appointments. All contractors within scope of this exercise have been required to provide evidence of tax compliance. All off-payroll appointments were tax compliant as at 31st March 2020.

MacPherson Review of Quality Assurance

Business Critical Models UKAEA conducted a review of analytical modelling as advocated by the Macpherson review (2013) and can confirm that it conducts no analytical modelling within the scope of the review

Governance of Knowledge and Information Assets

The CFO has delegated authority from the Board in respect of knowledge and information management governance and policy making. The CFO is also the Executive Lead for data, with overall accountability and ownership. The CFO is supported by Information Asset Owners (IAOs), to ensure business critical and sensitive information assets are managed appropriately so that the value of our information assets is protected, as described by our risk appetite.

Counter fraud

During the past year, we have continued to implement actions in line with the Government Counter Fraud Standard 013. Through our relationship with GIAA, we can access Accredited Counter Fraud Specialists as required. During the year we utilised this expert input during a series of risk workshops, raising awareness across the organisation. This is now being developed into an ongoing part of our risk management processes, with the development of a specific Fraud Risk Register which cuts across functional or technical boundaries.

BOARD ASSURANCE COMMITTEE

Overview

The Board Assurance Committee's principal responsibility is to assure the Board that appropriate processes and monitoring are in place to effectively manage UKAEA's risks relating to safety, health, environment, security, quality and good scientific reputation.

Enterprise Risk Management oversight is undertaken by the Executive Committee and reported into the Board bi-annually. The annual Audit Plan is informed by the UKAEA's risks and associated mitigations to drive risk reduction and continual improvement. Together the Board Assurance Committee and the Audit Committee provide a holistic opinion of the effectiveness of these management controls.

The Board Assurance Committee met four times during the year. The committee is chaired by a Non-Executive Director and membership includes operational leaders, the Head of Assurance and externals with significant operational safety experience. The principal responsibility is to assure the Board that appropriate processes and monitoring are in place to effectively manage UKAEA's risks relating to security, safety, health, environment, quality and good scientific reputation.

Composition of the Board Assurance Committee

The Chair of the Board Assurance Committee was Chris Theobald. The COO and Head of Assurance are the key management attendees and the quorum of the committee is at least two members independent of management. The Lead Safety Representative, a Department Manager on rotation and the Senior Information Risk Owner are also in attendance.

Attendance

Chris Theobald	4 (4)	Chair	Department Manager	2 (2)	(by rotation)
Jim MacHardy	4 (4)	Independent Board Advisor	Antonia Jenkinson	2 (2)	Chief Financial Officer (SIRO)
Alan Kaye	4 (4)	Independent Board Advisor	Sam Jackson	4 (4)	Head of SHE Group
David Martin	1 (2)	Executive Team Member - COO	Julian Lewis	3 (4)	Lead Safety Representative
Lynne Maclean, MBE	2 (3)	Executive Team Member - COO			
Kay Nicholson	4 (4)	Executive Team Member - Assurance			

Under its terms of reference, the Committee is responsible for:

- Monitoring and reviewing the development, implementation and effectiveness of security, safety, health, environment, quality processes and good scientific practice
- Promoting proactive improvements in performance and safety culture, including identifying opportunities to learn from and share good practices with outside organisations where it is considered prudent to do so
- Conducting or initiate reviews as appropriate within its terms of reference.

Key areas considered by the Board Assurance Committee during the year:

In addition to regular update reports on Safety, Health and Wellbeing, Quality, Security, Information Assurance and Legislation, other areas considered by the Board Assurance Committee during the year included:

- Preparations for tritium operations; regular updates were received on the overall status of the project for delivering JET DT capability where it impacts on assurance matters. While noting the significant technical challenges the project has faced the committee has been able to provide assurance to the Board of the progress in the key areas. In addition, one of the committee's independent advisors has regular meetings with the project team to review those matters requiring further detailed consideration
- Progression of UKAEA's safety cultural change programme; the behavioural safety initiative is progressing well with Mentors fully trained and Bite Sized Modules being produced and rolled out across the organisation
- Scientific quality; as part of its remit to assure that UKAEA's scientific reputation is maintained, the committee noted that existing regular monitoring indicates that science quality remains high. However, it has requested further development into additional quantitative measures of science quality
- Business Resilience; updates were provided on the strategy to mature the business continuity management framework, highlights on the further work planned over the next 3 years, improvements in Crisis Management planning, with a focus on DT exercising and plans for department Business Continuity Plans to be reviewed for the impact of the coronavirus
- Briefing on a serious incident; following a serious near-miss incident where an on-site contractor dropped a load being lifted in one of the operational areas and the subsequent investigation, an independent inquiry panel, led by the chair of the Board Assurance Committee, was convened to carry out a root and branch review and seek best practice. This will be concluded once COVID-19 lockdown restrictions are lifted, enabling an on-site visit.

Management Systems Audit

- Updates were received on the status of the Management Systems audit programme, which helps ensure that the UKAEA's internal processes are operating effectively, in accordance with legislative requirements, internal procedures and international management system standards relating to Quality, Safety and Environment. Audit resource has been supplemented both internally and externally. The additional resource has enabled closer alignment between Management System and Internal Audit functions and greater drive for implementation of process improvements
- The on-time closure of Management Systems audit actions for 2019/20 was 100%, 73% and 88% for Major Non-Conformances, Minor Non-Conformances and Opportunity for Improvement respectively
- UKAEA utilises a number of self-assessment tools supplied via BEIS / Cabinet Office that are based on government standards and maturity models. These provide a valuable insight and measure of assurance to UKAEA management. Two examples of these are the Departmental Security Health Check which measures the robustness of security controls across all aspects of physical, personnel and information / cyber security; and, the Knowledge and Information Management Model which measures maturity.

Information Security

- The CFO has delegated authority from the Board in respect of knowledge and information management governance and policy making. The CFO is also the Executive Lead for data, with overall accountability and ownership. Information risks are overseen by an Information Assurance Steering Committee which feeds significant risks into the Corporate Risk Review Group. During the year GDPR awareness training was undertaken by all relevant employees, further information assurance training was rolled out to Information Asset Owners and their Local Information Managers. Internal communications continued throughout the year to all staff, with key themes of cyber and information security which has proved particularly relevant in prevailing circumstances. Following reaccreditation to Cyber Essentials, the UKAEA is now aligned with the Government's 10 Steps to Cyber Security Framework. Azure Information Protection has been successfully implemented, which automatically applies classification and encryption to required documents and emails. A new Network Access Control (NAC) system is being delivered, which will control what devices can connect to the data network and only permit connections that meet specified security standards
- There have been no reportable data breaches or data loss incidents during the year
- One action from the Cyber Security Review is overdue. A formal extension has been submitted and the associated risk is assessed as 'low'.

REMUNERATION COMMITTEE

The Remuneration Committee met four times during the year. All its members are independent Non-Executive Directors. Where necessary, non-committee members are invited to attend. Until February 2020, the Remuneration Committee was chaired by Norman Harrison. Upon the end of his term as a Non-Executive Director, David Gann became the formal chair.

The Committee's principal responsibility is to make recommendations to BEIS on the level of Directors' remuneration. In addition, the Committee regularly reviews UKAEA's executive remuneration policy in relation to its competitors and industry norms and contract periods. The Committee also advises on any Human Resources policy issue or any proposed change to remuneration arrangements or terms and conditions of UKAEA staff generally which would require the agreement of Government.

As the members of the UKAEA Board are appointed by BEIS, UKAEA does not maintain a nominations committee.

Attendance

Norman Harrison	4 (4)	Chair
Norman Harrison	1 (1)	Independent Board Advisor
Professor David Gann	5 (5)	Non-Executive Director
Chris Theobald	5 (5)	Non-Executive Director
Shrinivas Honap	5 (5)	Non-Executive Director
Sue Scane	5 (5)	Non-Executive Director
Professor Sir Adrian Smith FRS	2 (5)	Non-Executive Director
Ian Chapman	5 (5)	Executive Attendee
Gill Lay	5 (5)	Executive Secretariat

REMUNERATION AND STAFF REPORT

Remuneration Policy

The remuneration of Directors is set by the Secretary of State for BEIS with the approval of HM Treasury in accordance with the Atomic Energy Authority Act 1954. The UKAEA Remuneration Committee makes recommendations to BEIS on the overall remuneration package for Executive Directors. The Non-Executive Directors who form the Committee are not involved in decisions relating to their own remuneration.

In reaching its recommendations, the Committee has regard to the following considerations:

- the need to recruit, retain and motivate suitably able and qualified people to exercise their different responsibilities; and
- the funding available to UKAEA.

The Committee takes account of the evidence it receives about wider economic considerations and the affordability of its recommendations.

Service contracts

Executive Directors are appointed by the Secretary of State for BEIS. This is normally for a three-year term that may be renewed upon expiry in accordance with the guidelines issued by the Commissioner for Public Appointments.

REMUNERATION AND PENSION ENTITLEMENTS

The individual components of the remuneration packages are:

Salary and fees

The CEO as Executive Director receives a basic salary which is reviewed annually by UKAEA's Remuneration Committee. The Chair and Non-Executive Directors receive fees for their services. Members of the Executive Team also receive a basic salary which is reviewed annually by the Remuneration Committee. The Remuneration Committee makes recommendations to BEIS as appropriate.

Benefits

Some members of the Executive Team receive a car allowance.

Executive Directors, and members of the Executive Team, are also reimbursed for reasonable expenses incurred in line with the policy for UKAEA's employees. These reimbursements are not included in the table below.

Performance related bonuses

The performance bonuses for Executive Directors are calculated in accordance with performance against agreed objectives, confirmed by BEIS on the basis of recommendations from the Remuneration Committee. The total bonus is made up of two components: the performance of UKAEA against specific quantified targets, and the performance of the individual against specific targets. Members of the Executive Team receive bonuses based on formulae that are agreed each year by the Remuneration Committee, and which are subject to approval by BEIS where applicable. The performance-related bonuses for 2019/20 shown in the table below have been calculated on the basis of assessment by the Remuneration Committee of performance against the relevant specific targets. Payment of the CEO's bonus is subject to approval by BEIS.

Individual Board Directors' remuneration for the year is shown in the next table, with salaries disclosed on an accruals basis.

This part of the report is subject to audit.

2019/20	Salary/ Fees £k	Benefits ^(e) to nearest £100	Annual bonus £k	Pension benefit ^(g) £k	2019/20 Total £k
Chair					
David Gann	20-25	600	–	–	25-30
Non-Executive Directors					
Norman Harrison (to 29 February 2020)	10-15	300	–	–	10-15
Shrin Honap	10-15	500	–	–	15-20
Sue Scane	10-15	100	–	–	15-20
Adrian Smith	10-15	–	–	–	10-15
Chris Theobald	10-15	1,100	–	–	15-20
Executive Directors					
Ian Chapman	170-175	–	20-25	18	215-220
Antonia Jenkinson	130-135	–	10-15	15	160-165

2018/19	Salary/ Fees £k	Benefits ^(e) to nearest £100	Annual bonus £k	Pension benefit ^(g) £k	2018/19 Total £k
Chair					
Roger Cashmore (to 31 July 2018) ^(a)	5-10	–	–	–	5-10
David Gann (from 1 August 2018) ^(a)	15-20	1,200	–	–	15-20
Non-Executive Directors					
Norman Harrison	10-15	200	–	–	15-20
Shrinivas Honap	10-15	1,200	–	–	15-20
Jim Hutchins (to 28 February 2019) ^(b)	10-15	400	–	–	10-15
Sue Scane	10-15	100	–	–	15-20
Adrian Smith	10-15	–	–	–	10-15
Chris Theobald	10-15	1,300	–	–	15-20
Executive Directors					
Ian Chapman	165-170	–	20-25	–	190-195
Antonia Jenkinson (from 11 February 2019) ^(c)	15-20	–	–	4	20-25

Notes:

- Remuneration tables only include Board members for 2019/20 and 2018/19. Non-board members previously reported have been excluded.
- Roger Cashmore retired as Chair on 31 July 2018. David Gann was appointed Chair from 1 August 2018. The full year remuneration for the Chair was £25k.
- The 2018/19 full year fees were £15k.
- The 2018/19 full year salaries for Catherine Pridham and Antonia Jenkinson were in the ranges £120-125k and £130-135k respectively.
- Expenses disclosed for the Chair and Non-Executive Directors in 2020 and in the comparatives for 2019 relate to travel for Board and other meetings at Culham and include the tax liability on these expenses which was met by UKAEA. These expenses vary depending on the distance of the individual's home from Culham.
- Annual bonuses disclosed in the Accounts are subject to approval by BEIS where applicable. 2019/20 bonuses are estimated, and the actual 2018/19 bonuses awarded did not differ materially from those reported in the comparative for 2018/19.
- The value of pensions benefits accrued during the year is calculated as (the real increase in pension multiplied by 20) plus (the real increase in any lump sum) less (the contributions made by the individual). The real increases exclude increases due to inflation or any increase or decrease due to a transfer of pension rights. In some cases, the pensions benefit is negative in real terms where pay increases and additional service have not offset the effect of inflation. The presentation of negative pension benefit has been changed for 2018/19. Where there is a negative benefit, nil benefit is shown in the remuneration tables. The comparatives have been left unchanged.

ACCOUNTABILITY REPORT**Remuneration ratios**

These figures are subject to audit.

	2019/20 £	2018/19 £
Highest Paid Director's Total Remuneration	200k - 205k	190k - 195k
Median Total Remuneration	44,517	42,458
Ratio	4.50	4.59

Reporting bodies are required to disclose the relationship between the remuneration of the highest paid Director in their organisation and the median remuneration of the organisation's workforce.

In 2019/20, No (2018/19, No) employees received remuneration in excess of the highest paid Director.

Remuneration ranged from £13,335 to £200,489 (2018/19 £11,721 to £194,766).

Total remuneration includes salary, non-consolidated performance-related pay and benefits-in-kind. It does not include severance payments, employer pension contributions and the cash equivalent transfer value of pensions.

Pension entitlements (subject to audit)

Executive Directors are members of the United Kingdom Atomic Energy Authority Combined Pension Scheme that pays an annual pension based on pensionable final earnings together with a lump sum at normal retirement age. Benefits are also payable in the event of death or ill health retirement. UKAEA also operates an unfunded pension arrangement for three former Chief Executives to take account of pensionable pay above the earnings cap introduced by the Finance Act 1989.

Further details of the pension schemes and unfunded pensions can be found later in the Remuneration and Staff Report.

ACCOUNTABILITY REPORT

The pension entitlements shown in the table below are those that would be paid annually on retirement based on service to 31 March 2020 and include the value of added years paid for by Directors.

	Accrued pension as at 31/3/20 £k	Lump sum as at 31/3/20 £k	Real increase in accrued pension ^(a) £k	Real increase in lump sum ^(a) £k
Ian Chapman	20-25	70-75	0-2.5	2.5-5
Antonia Jenkinson	10-15	20-25	5-7.5	20-22.5

Notes:

(a) The real increase has been calculated after subtracting inflation.

(b) Remuneration tables only include Board members for 2019/20 and 2018/19. Non-board members previously reported have been excluded

The following table (which is subject to audit) sets out the Cash Equivalent Transfer Value (CETV) of the Executive Directors' accrued pension entitlements which have been calculated by the Scheme managers in accordance with the Occupational Pension Schemes (Transfer Values) Regulations 1996 as amended, having taken actuarial advice. The transfer values do not represent sums paid or payable to the Directors or Executive Committee members but represent a potential liability of the pension scheme or UKAEA.

	CETV at 31 March 2019 £k	Real increase in CETV ^(a) £k	CETV at 31 March 2020 £k
Executive Directors			
Ian Chapman	339	8	361
Antonia Jenkinson	5	(7)	143

Notes:

(a) The real increase has been calculated after subtracting inflation

(b) Remuneration tables only include Board members for 2019/20 and 2018/19. Non-board members previously reported have been excluded

Members of the pension scheme have the option to pay Additional Voluntary Contributions; neither the contributions nor the resulting benefits are included in the above tables.

STAFF REPORT

This section is subject to audit.

Staff Costs

Staff costs comprise:

	2020 £k	2019 £k
Permanently employed staff:		
Salaries, bonuses and allowances	52,778	42,558
Social Security costs	6,073	4,899
Pension costs	8,427	6,900
	67,278	54,357
Other staff	21,151	17,708
	88,429	72,065

Staff numbers

The average number of full-time equivalent staff during the year was as follows:

	2020	2019
Directly employed	1,110	922
Other staff	351	327
	1,461	1,249

Other staff are hired staff. Most these are used to carry out specialist work in UKAEA's scientific facilities.

Staff composition as at 31 March 2020 (not subject to audit)

All figures in the tables below relate to actual staff numbers at the year-end rather than to average full time equivalents.

Board and senior staff

	Male	Female	Total
Board members	6	2	8
Executive Committee	8	5	13
Senior staff	10	3	13

All Employees

	2020	2019
Male	956 (76.1%)	783 (76.8%)
Female	300 (23.9%)	237 (23.2%)

Sickness absence (not subject to audit)

The average sickness absence per employee for UKAEA during the 2019/20 year was 6.5 days per person, compared with 6.4 days in 2018/19. This is considerably lower than the public sector average of 8 days per employee for all public services workers as disclosed in the latest Chartered Institute of Personnel and Development Health and Wellbeing at work report.

UKAEA Pension Schemes

(a) Defined benefit schemes

UKAEA has three defined benefit schemes: The Combined Pension Scheme (CPS), the Principal Non-Industrial Superannuation Scheme (PNISS) and the Protected Persons Superannuation Scheme (PPSS). These schemes have members from other employers as well as UKAEA. No information in these financial statements relates to other employers participating in the CPS, PNISS or PPSS. The Group has overall responsibility for the management of the schemes under a Framework Agreement with BEIS. No contingent liability is expected to arise from this responsibility.

In common with other public sector schemes, the CPS, the PNISS and the PPSS do not have many of the attributes of normal pension schemes. All contributions are paid to and benefits paid by HM Government via the Consolidated Fund. Any surplus of contributions made in excess of benefits paid out in any year is surrendered to the Consolidated Fund and any liabilities are met from the Consolidated Fund via the annual Parliamentary vote. The Government does not maintain a separate fund and actuarial valuations are based on a theoretical calculation as to how a typical UK pension scheme would have invested the historical surplus of contributions over payments.

In accordance with the FReM, the schemes are accounted for as defined contribution schemes.

Employer contributions are calculated in accordance with HM Treasury methodology "Superannuation Contributions Adjusted for Past Experience" and are based on the expected cost of members' benefits as they accrue. The total contributions paid by the Group during the year were £8,402k (2019: £6,875k).

(b) Defined contribution schemes

UKAEA manages two defined contribution schemes, the Additional Voluntary Contribution (AVC) scheme and the Shift Pay Pension Savings Plan (SPPP) scheme, both of which are fully insured schemes administered by Prudential Assurance Company Ltd to whom contributions are paid.

The AVC scheme includes members from UKAEA and from other employers who are members of CPS or PPSS and who have opted to pay additional voluntary contributions. No employer contributions are made to this scheme.

The members of the SPPP scheme include shift working employees of UKAEA and other employers who are members of CPS or PPSS. The costs of the SPPP scheme, which are directly linked to shift pay earnings, are charged to the statement of comprehensive income at the time the shift pay is paid. The total contributions paid by UKAEA during the year were £25k (2019: £23k).

(c) Unfunded retirement benefits

Three former UKAEA chief executives have unfunded retirement benefits which are not included in the UKAEA pension schemes.

The movement in the liability for these benefits is shown below:

	Group and Authority	
	2019/20 £k	2018/19 £k
At 1 April 2019	2,106	2,251
Change in discount rate	231	(57)
Interest on liability	60	56
Benefits payable	(81)	(81)
Actuarial (gain) loss	(98)	(63)
At 31 March 2020	2,218	2,106

The interest on liability is included in the statement of comprehensive income and the actuarial loss is included in taxpayers' equity. The closing liability, discounted at the appropriate pensions liability discount rate, is included in other provisions for liabilities and charges in the statement of financial position (Further details of provisions are given in Note 20).

ACCOUNTABILITY REPORT

Staff Policy

UKAEA's equal opportunities policy requires that all job applicants enjoy equal opportunity for employment on the basis of ability, qualifications, experience and suitability for the work. We deliver in-house training on diversity and equality, unconscious bias and specific recruitment training. Both courses cover equality, diversity and inclusion, ensuring that line managers are aware of their responsibilities towards, and the benefits of, these topics.

UKAEA's equal opportunities policy provides a framework for ensuring that equality is considered throughout the employment of staff. For those who become disabled during their employment, we provide occupational health facilities which provide direct support to the employee and also advise line managers on modifications and restrictions which are required. In addition to the training mentioned above, HR Business Partners provide coaching on flexible working and unconscious bias to ensure that employees with disabilities are given equal opportunity in training, career development and promotion. UKAEA is also registered on the Disability Confident Scheme.

UKAEA is currently developing an Equality, Diversity and Inclusion strategy, with sponsorship at Board and Executive level, and has recruited an Equality, Diversity and Inclusion Partner to provide specialist knowledge and direction to the organisation.

Expenditure on consultancy

There was no expenditure on consultancy in either the current or the previous year.

Off-payroll appointments

(a) Off-payroll engagements as of 31 March 2020, for more than £245 per day that last for longer than six months

Number of existing engagements as of 31 March 2020	110
Of which:	
Number that have existed for less than one year at time of reporting	29
Number that have existed for between one and two years at time of reporting	37
Number that have existed for between two and three years at time of reporting	15
Number that have existed for between three and four years at time of reporting	7
Number that have existed for more than four years at time of reporting	22

(b) New off-payroll appointments, or those that reached six months in duration, between 1 April 2019 and 31 March 2020, for more than £245 per day and that last for longer than six months

Number of new engagements, or those that reached six months in duration, between 1 April 2019 and 31 March 2020	56
Of which:	
Number assessed as within the scope of IR35	56
Number assessed as not within the scope of IR35	-
Of which:	
Number engaged directly (via Personal Service company) and on UKAEA payroll	-
Number of engagements reassessed for consistency/assurance purposes during the year	-
Number of engagements that saw a change to IR35 status following the consistency review	-

ACCOUNTABILITY REPORT

(c) Off-payroll engagements of board members, and/or senior officials with significant financial responsibility, between 1 April 2019 and 31 March 2020

Number of off-payroll engagements of board members, and/or senior officials with significant financial responsibility, during the financial year	2
Total number of individuals on payroll that have been deemed "board members, and/or senior officials with significant financial reporting responsibility" during the year.	14

The two off-payroll appointments were of Non-Executive Board members who reached the end of their appointment during the year and retained on a short-term basis pending the appointment of new Non-Executive Board members.

(d) AEA Insurance Limited (see also Note 13a): Off-payroll engagements of board members, and/or senior officials with significant financial responsibility, between 1 April 2019 and 31 March 2020.

Number of off-payroll engagements of board members, and/or senior officials with significant financial responsibility, during the financial year	2
Total number of individuals on payroll and off payroll that have been deemed "board members, and/or senior officials with significant financial responsibility" during the financial year.	2

Engagements from 2002 and 2005 respectively: AEAIL is a captive insurance company registered in the Isle of Man and subject to their tax and NI legislation. AEAIL does not employ anyone. Two AEAIL Directors are off-payroll by default and are paid a small fee by AEAIL.

From 2014 to 2020: The third off-payroll Director is an employee of UKAEA and on UKAEA payroll.

Trade Union Facility Time

Table 1 – Relevant Union Officials

Number of employees who were relevant union officials during the relevant period	Full-time equivalent employee number
14	14

Table 2: Percentage of time spent on facility time

Percentage of working time spent on facility time by employees who were relevant union officials	Number of employees
0%	-
1-50%	14
51-99%	-
100%	-

Table 3: Percentage of pay bill spent on facility time

	Figures £
Total cost of facility time	8,251
Total pay bill	67,278k
Percentage of the total pay bill spent on facility time, calculated as: (total cost of facility time ÷ total pay bill) x 100	0.012%

Table 4: Paid trade union activities

Time spent on paid trade union activities as a percentage of total paid facility time hours calculated as: (total hours spent on paid trade union activities by relevant union officials during the relevant period ÷ total paid facility time hours) x 100	Nil
---	-----

Exit packages paid to employees (audited)

Exit package cost band	Number of compulsory redundancies		Number of other departures agreed		Total number of exit packages by cost band	
	2019/20	2018/19	2019/20	2018/19	2019/20	2018/19
<£10,000	–	–	2	1	2	1
£10,000 - £25,000	–	–	–	–	–	–
£25,000 - £50,000	–	1	–	–	–	1
£50,000 - £100,000	–	–	–	–	–	–
£100,000 - £150,000	–	–	–	–	–	–
Total number of exit packages	–	1	2	1	2	2

The departures disclosed above relate to early releases which are within the terms set out in UKAEA's Conditions of Employment Manual or have been subject to separate and appropriate approval processes. Where applicable, the additional costs of early releases are met by UKAEA and not by UKAEA's CPS. Ill-health retirement costs are met by the CPS and these retirements are not included in the table.

OTHER PARLIAMENTARY DISCLOSURES

Fees and Charges (audited)

UKAEA does not receive fees and charges for public services, as defined by HM Treasury in Managing Public Money. There are therefore no related disclosures.

Losses and Special Payments (audited)

There were no reportable losses and special payments during the financial year.

Remote Contingent Liabilities (audited)

UKAEA has no significant remote contingent liabilities to report.

COVID-19 Pandemic Impact

In November 2019 a novel strain of coronavirus was detected and spread rapidly, leading the World Health Organisation to declare a pandemic on 11 March 2020. The pandemic caused significant economic disruption just before the financial year end. The ongoing disruption caused by the pandemic has created significant economic uncertainty, and this uncertainty is expected to continue throughout 2020. No contingent liabilities or assets have been recognised.

EU Exit

On 29 March 2017, the UK Government submitted its notification to leave the EU in accordance with Article 50. On 31 January 2020, the Withdrawal Agreement between the UK and the EU became legally binding and the UK left the EU. The future relationship between the EU and the UK will be determined by negotiations taking place during a transition period ending 31 December 2020. Any subsequent changes in legislation, regulation and funding arrangements are subject to the outcome of the negotiations. No contingent liabilities or assets have been recognised relating to these changes.



Professor Ian Chapman
Chief Executive and Accounting Officer
13th July 2020

THE CERTIFICATE AND REPORT OF THE COMPTROLLER AND AUDITOR GENERAL TO THE HOUSES OF PARLIAMENT

Opinion on financial statements

I certify that I have audited the financial statements of United Kingdom Atomic Energy Authority for the year ended 31 March 2020 under the Atomic Energy Authority Act 1954. The financial statements comprise: the Group and Parent Statements of Comprehensive Income, Financial Position, Cash Flows, Changes in Taxpayers' Equity; and the related notes, including the significant accounting policies. These financial statements have been prepared under the accounting policies set out within them. I have also audited the information in the Accountability Report that is described in that report as having been audited.

In my opinion:

- the financial statements give a true and fair view of the state of the Group's and of the United Kingdom Atomic Energy Authority's affairs as at 31 March 2020 and of the Group's and the Parent's profit for the year then ended; and
- the financial statements have been properly prepared in accordance with the Atomic Energy Authority Act 1954 and Secretary of State directions issued thereunder.

Emphasis of matter – Disclosure in relation to the valuation of property assets

I draw attention to Note 11, Property Plant and Equipment, Note 12 Investment Property, and Note 13.2 Investment in Joint Venture of the financial statements, which describes the material uncertainty as a result of COVID-19 in the valuation of property assets held directly or indirectly by United Kingdom Atomic Energy Authority. My opinion is not modified in respect of this matter.

Opinion on regularity

In my opinion, in all material respects the income and expenditure recorded in the financial statements have been applied to the purposes intended by Parliament and the financial transactions recorded in the financial statements conform to the authorities which govern them.

Basis of opinions

I conducted my audit in accordance with International Standards on Auditing (ISAs) (UK) and Practice Note 10 'Audit of Financial Statements of Public Sector Entities in the United Kingdom'. My responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the financial statements section of my certificate. Those standards require me and my staff to comply with the Financial Reporting Council's Revised Ethical Standard 2016. I am independent of the United Kingdom Atomic Energy Authority in accordance with the ethical requirements that are relevant to my audit and the financial statements in the UK. My staff and I have fulfilled our other ethical responsibilities in accordance with these requirements. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

Conclusions relating to going concern

I have nothing to report in respect of the following matters in relation to which the ISAs (UK) require me to report to you where:

- the United Kingdom Atomic Energy Authority's use of the going concern basis of accounting in the preparation of the financial statements is not appropriate; or
- the United Kingdom Atomic Energy Authority have not disclosed in the financial statements any identified material uncertainties that may cast significant doubt about the United Kingdom Atomic Energy Authority's ability to continue to adopt the going concern basis of accounting for a period of at least twelve months from the date when the financial statements are authorised for issue.

Responsibilities of the Accounting Officer for the financial statements

As explained more fully in the Accounting Officer's Statement, the Accounting Officer is responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view.

Auditor's responsibilities for the audit of the financial statements

My responsibility is to audit, certify and report on the financial statements in accordance with the Atomic Energy Authority Act 1954.

An audit involves obtaining evidence about the amounts and disclosures in the financial statements sufficient to give reasonable assurance that the financial statements are free from material misstatement, whether caused by fraud or error. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs (UK), I exercise professional judgment and maintain professional scepticism throughout the audit. I also:

- identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Group's and the United Kingdom Atomic Energy Authority's internal control.
- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. I am responsible for the direction, supervision and performance of the group audit. I remain solely responsible for my audit opinion.
- conclude on the appropriateness of the United Kingdom Atomic Energy Authority's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the group's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. My conclusions are based on the audit evidence obtained up to the date of my report. However, future events or conditions may cause the group to cease to continue as a going concern.

I communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

In addition, I am required to obtain evidence sufficient to give reasonable assurance that the income and expenditure reported in the financial statements have been applied to the purposes intended by Parliament and the financial transactions conform to the authorities which govern them.

Other Information

The Accounting Officer is responsible for the other information. The other information comprises information included in the annual report, but does not include the parts of the Accountability Report described in that report as having been audited, the financial statements and my auditor's report thereon. My opinion on the financial statements does not cover the other information and I do not express any form of assurance conclusion thereon. In connection with my audit of the financial statements, my responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or my knowledge obtained in the audit or otherwise appears to be materially misstated. If, based on the work I have performed, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

Opinion on other matters

In my opinion:

- the parts of the Accountability Report to be audited have been properly prepared in accordance with Secretary of State directions made under the Atomic Energy Authority Act 1954;
- in the light of the knowledge and understanding of the group and the parent and its environment obtained in the course of the audit, I have not identified any material misstatements in the Performance Report or the Accountability Report; and
- the information given in the Performance Report and Accountability Report for the financial year for which the financial statements are prepared is consistent with the financial statements.

Matters on which I report by exception

I have nothing to report in respect of the following matters which I report to you if, in my opinion:

- adequate accounting records have not been kept or returns adequate for my audit have not been received from branches not visited by my staff; or
- the financial statements and the parts of the Accountability Report to be audited are not in agreement with the accounting records and returns; or
- I have not received all of the information and explanations I require for my audit; or
- the Governance Statement does not reflect compliance with HM Treasury's guidance.

Report

I have no observations to make on these financial statements.

Gareth Davies
Comptroller and Auditor General

Date: 15th July 2020

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

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

for the year ended 31 March 2020

	Note	Group		Authority	
		2020 £k	2019 £k	2020 £k	2019 £k
Income					
Revenue	5	155,622	116,766	153,294	113,497
Other Income		555	4,392	726	5,229
Less: share of revenue of joint venture		(2,328)	(3,139)	–	–
		153,849	118,019	154,020	118,726
Expenditure					
Raw materials and consumables		36,286	23,547	36,286	23,547
Other external expenses		45,315	35,322	45,315	35,322
Staff costs	6	88,429	72,065	88,429	72,065
Depreciation, amortisation and impairment		2,386	1,942	2,386	1,942
Other expense		(224)	1,679	611	1,288
Costs charged to provisions		(345)	(584)	(345)	(584)
		171,847	133,971	172,682	133,580
Revaluation adjustment		(1,222)	9,559	(1,222)	9,559
Costs capitalised		(16,517)	(15,489)	(16,517)	(15,489)
		154,108	128,041	154,943	127,650
Operating (loss)/profit					
		(259)	(10,022)	(923)	(8,924)
Finance income	8	226	146	169	88
Finance expense	8	(83)	(16)	(83)	(16)
Loss on disposal of assets		879	(4)	879	(4)
Share of profit/(loss) of joint venture after tax	13	1,545	4,582	–	–
Profit/(loss) before tax	9	2,308	(5,314)	42	(8,856)
Current tax credit – RDEC	10	4,497	3,591	4,497	3,591
Deferred tax (debit)/credit	10	(548)	2,044	(548)	2,044
Profit/(loss) for the year		6,257	321	3,991	(3,221)
Other comprehensive income					
Net gain/(loss) on revaluations		2,745	9,805	2,391	(416)
Actuarial gains/(losses) on defined benefit pension plans		(133)	120	(133)	120
Income tax (debit)/credit relating to components of other comprehensive income		(903)	227	(903)	227
Other comprehensive income for the year		1,709	10,152	1,355	(69)
Total comprehensive income for the year		7,966	10,473	5,346	(3,290)

The notes on pages 92 to 116 are an integral part of these financial statements.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

as at 31 March 2020

	Note	Group		Authority	
		2020 £k	2019 £k	2020 £k	2019 £k
Non-current assets					
Property, plant and equipment	11	75,332	59,064	75,332	59,064
Investment property	12	53,857	50,520	53,857	50,520
Financial assets	13	51,588	49,689	18,623	18,623
Other receivables	15	466,971	458,704	466,971	458,704
Total non-current assets		647,748	617,977	614,783	586,911
Current assets					
Inventories		114	11	114	11
Trade and other receivables	15	33,652	30,799	34,880	30,956
Financial assets	13	5,599	6,811	–	–
Cash and cash equivalents	16	60,455	57,393	58,239	56,162
Total current assets		99,820	95,014	93,233	87,129
Total assets		747,568	712,991	708,016	674,040
Current liabilities					
Trade and other payables	17	60,278	52,654	60,264	52,646
Provisions for liabilities and charges	20	5,295	6,978	4,995	6,728
Total current liabilities		65,573	59,632	65,259	59,374
Total assets minus current liabilities		681,995	653,359	642,757	614,666
Non-current liabilities					
Other payables	17	1,537	1,322	1,537	1,322
Deferred income	18	10,749	7,927	10,749	7,927
Deferred income tax liabilities	19	9,502	8,052	9,502	8,052
Provisions for liabilities and charges	20	471,963	471,159	470,967	468,088
Total non-current liabilities		493,751	488,460	492,755	485,389
Assets less liabilities		188,244	164,899	150,002	129,277
Taxpayers' equity					
General reserve		13,658	13,658	13,658	13,658
Revaluation reserve		14,470	12,986	14,470	12,986
Capital Grants reserve		45,124	31,120	45,124	31,120
Retained earnings		114,992	107,135	76,750	71,513
Total taxpayers' equity		188,244	164,899	150,002	129,277

The notes on pages 92 to 116 are an integral part of these financial statements.



Professor Ian Chapman
Chief Executive and Accounting Officer
13th July 2020

CONSOLIDATED STATEMENT OF CASH FLOWS

for the year ended 31 March 2020

	Note	Group		Authority	
		2020 £k	2019 £k	2020 £k	2019 £k
Cash flows from operating activities					
Profit for the year		6,257	321	3,991	(3,221)
Adjustments for non-cash transactions:					
– Depreciation, amortisation and impairment		2,386	1,943	2,386	1,943
– Deferred income released	18	(348)	(264)	(348)	(264)
– Change in fair value of investment property	12	(1,222)	9,558	(1,222)	9,558
– Loss on disposal of property, plant and equipment		–	4	–	4
– Loss/(profit) on sale of investment property		(879)	–	(879)	–
– Net finance income recognised		(143)	(130)	(86)	(72)
– Income tax debit/(credit)	10	(3,949)	(5,635)	(3,949)	(5,635)
– Share of loss/(profit) of joint venture		(1,545)	(4,582)	–	–
Changes in working capital:					
– (Increase)/decrease in trade and other receivables		(5,062)	5,515	(6,133)	6,209
– (Increase)/decrease in inventories		(102)	–	(102)	–
– (Increase)/decrease in current financial assets		1,212	(42)	–	–
– Increase/(decrease) in trade and other payables		11,262	18,779	11,259	18,778
– Use of and change in provisions, net of the movement on reimbursement receivables		(3,309)	(621)	(1,287)	(1,705)
Net cash inflow/(outflow) from operating activities		4,558	24,846	3,630	25,595
Cash flows from investing activities					
Purchase of property, plant and equipment	11	(18,472)	(15,973)	(18,472)	(15,973)
Sale of investment property		973	–	973	–
Investment in joint venture	13	–	(1,900)	–	(1,900)
Net cash inflow/(outflow) from investing activities		(17,499)	(17,873)	(17,499)	(17,873)
Cash flows from financing activities					
Grant from sponsoring department		15,777	13,158	15,777	13,158
Interest received		226	146	169	88
Net cash inflow/(outflow) from financing activities		16,003	13,304	15,946	13,246
Net increase/(decrease) in cash and cash equivalents in the period		3,062	20,277	2,077	20,968
Cash and cash equivalents at the beginning of the period		57,393	37,116	56,162	35,194
Cash and cash equivalents at the end of the period		60,455	57,393	58,239	56,162

The notes on pages 92 to 116 are an integral part of these financial statements.

CONSOLIDATED STATEMENT OF CHANGES IN TAXPAYERS' EQUITY

for the year ended 31 March 2020

Group	General reserve £k	Revaluation reserve £k	Capital grants reserve (Note a) £k	Retained earnings £k	Total £k
Balance at 1 April 2018	13,658	13,671	–	114,171	141,500
Restatement of Opening Balance due to IFRS 15 at 31 March 2018	–	–	–	(232)	(232)
Profit/(loss) for the year					
Movement to Capital Grant Reserve(a)	–	–	19,038	(19,038)	–
Capital Grant from sponsoring department	–	–	13,158	–	13,158
Total comprehensive income for the year	–	(190)	–	10,663	10,473
Depreciation transfer	–	(457)	(1,076)	1,533	–
Revaluation transfer	–	(38)	–	38	–
Balance at 31 March 2019	13,658	12,986	31,120	107,135	164,899
Changes in Taxpayers' Equity 2019/20					
Capital Grant from sponsoring department	–	–	15,379	–	15,379
Total comprehensive income for the year	–	1,489	–	6,477	7,966
Depreciation transfer	–	(5)	(1,375)	1,380	–
Revaluation transfer	–	–	–	–	–
Balance at 31 March 2020	13,658	14,470	45,124	114,992	188,244

Note (a) - UKAEA has made a presentational change in 2018/19 to the accounts to show the net of capital grants received from BEIS and the associated depreciation in a separate capital grants reserve, rather than as part of Retained Earnings. There is no impact on overall reserves from this change.

Authority	General reserve £k	Revaluation reserve £k	Capital grants reserve (Note a) £k	Retained earnings £k	Total £k
Balance at 1 April 2018	13,658	13,671	–	92,312	119,641
Restatement of Opening Balance due to IFRS 15 at 31 March 2018	–	–	–	(232)	(232)
Profit/(loss) for the year					
Movement to Capital Grant Reserve(a)	–	–	19,038	(19,038)	–
Capital Grant from sponsoring department	–	–	13,158	–	13,158
Total comprehensive income for the year	–	(190)	–	(3,100)	(3,290)
Depreciation transfer	–	(457)	(1,076)	1,533	–
Revaluation transfer	–	(38)	–	38	–
Balance at 31 March 2019	13,658	12,986	31,120	71,513	129,277
Changes in Taxpayers' Equity 2019/20					
Capital Grant from sponsoring department	–	–	15,379	–	15,379
Total comprehensive income for the year	–	1,489	–	3,857	5,346
Depreciation transfer	–	(5)	(1,375)	1,380	–
Revaluation transfer	–	–	–	–	–
Balance at 31 March 2020	13,658	14,470	45,124	76,750	150,002

See Note (a) above. The notes on pages 92 to 116 are an integral part of these financial statements.

NOTES TO THE FINANCIAL STATEMENTS

1 General information

UKAEA is an NDPB and was established by the Atomic Energy Authority Act 1954. The address of UKAEA's registered office is Culham Science Centre, Abingdon, Oxfordshire, OX14 3DB. Its sponsoring government department is the Department for Business, Energy and Industrial Strategy. UKAEA and its subsidiaries are referred to as "the Group".

2 Basis of preparation

The financial statements comply with the provisions of the Atomic Energy Authority Act 1954 and the requirements of HM Treasury. The latter requires the financial statements to be prepared in accordance with the Government Financial Reporting Manual (FReM) issued by HM Treasury as updated annually. The accounting policies contained in the FReM apply International Financial Reporting Standards (IFRS) as adapted or interpreted for the public sector. Where the FReM permits a choice of accounting policy, the accounting policy which is judged to be most appropriate to the particular circumstances of the Group for the purpose of giving a true and fair view has been selected.

The financial statements have been prepared on a going concern basis.

The Board, Executive Team and Accounting Officer believe that the commitment from international parties and the UK Government to fusion research, the growth of UKAEA, combined with the acceptance by BEIS of responsibility for costs associated with UKAEA site restoration and restructuring liabilities, is sufficient to support continuing operations for the foreseeable future.

The financial statements are presented in pounds sterling, which is UKAEA's functional currency, and have been prepared under the historical cost convention, except for land and buildings, investment properties, assets held-for-sale and derivative financial instruments which are stated at fair value.

The preparation of financial statements in conformity with IFRS requires judgements, estimates and assumptions to be made that affect the application of accounting policies and the reported amounts of income, expenses, assets and liabilities. Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognised in the period in which the estimates are revised and in any future periods affected. Information about significant areas of estimation uncertainty and critical judgements in applying accounting policies that have the most significant effect on the amounts recognised in the consolidated financial statements is included in the notes to the financial statements.

3 Significant accounting policies

The principal accounting policies applied by UKAEA and its subsidiary AEA Insurance Ltd (AEAIL) in the preparation of these financial statements are set out below. These policies have been applied consistently in dealing with all items that are considered material to the financial statements.

3.1 Provisions

Provisions are recognised when the Group has a present legal or constructive obligation as a result of past events; it is probable that an outflow of resources will be required to settle the obligation; and the amount has been reliably estimated.

UKAEA's site restoration provision is the most significant area of estimation uncertainty in the financial statements. Full details are in Note 20.

Where there are a number of similar obligations, the likelihood that an outflow will be required in settlement is determined by considering the class of obligations as a whole. A provision is recognised even if the likelihood of an outflow with respect to any one item included in the same class of obligations may be small.

Provisions are measured at the present value of the expenditures expected to be required to settle the obligation using real rates of

interest. The change in the provision due to passage of time and changes in discount rate is recognised as finance expense or finance income as appropriate.

Where assurances have been received from another party that they will reimburse some or all of the expenditure required to settle a provision, and the requirements for recognition of IAS 37.53 are met (i.e. it is virtually certain that reimbursement will be received if the obligation is settled) a reimbursement asset will be recognised to the extent of the amount expected to be reimbursed. The reimbursement asset is shown separately from the related provision in the statement of financial position.

3.2 Consolidation

(a) Subsidiaries

Subsidiaries are entities controlled by the Group. Control exists when the Group has the power to govern the financial and operating policies of an entity so as to obtain benefits from activities and actually exercises this power. In assessing control, potential voting rights that are currently exercisable are taken into account. The financial statements of subsidiaries are included in the consolidated financial statements from the date that control commences until the date that control ceases. The accounting policies of subsidiaries are changed when necessary to align them with the policies adopted by the Group.

(b) Joint ventures

Joint ventures are those entities over which the Group exercises joint control through a contractual arrangement. The results, assets and liabilities of joint ventures are incorporated in the consolidated financial statements using the equity method of accounting. Investments in joint ventures are initially carried in the statement of financial position at cost and subsequently adjusted by post-acquisition changes in the Group's share of the net assets of the joint venture, less any impairment in the value of individual investments. Losses of joint ventures in excess of the Group's interest in those joint ventures are not recognised, except where the Group has made a commitment to make good those losses.

(c) Transactions eliminated on consolidation

Intra-group transactions, balances and unrealised gains and losses on transactions between Group companies are eliminated on consolidation.

3.3 Revenue recognition

Revenue is recognised when a performance obligation has been delivered which reflects the point of control over a product or the transfer of a service to the customer and specific criteria having been met as described below.

Where applicable revenue from contracts with customers is recognised in line with IFRS 15 from 1 April 2019.

Revenue is shown net of value added tax, returns, rebates and discounts. A full disclosure of the effects of the implementation of IFRS 15 is given in Note 5.2.

(a) Service contracts

Revenue from cost recovery contracts for managing the UK's fusion research programme, the European Union's JET facility and in support of the wider European fusion research programmes is recognised to the extent of costs incurred in the period that are expected to be recoverable from customers.

Revenue from customer contracts is recognised under IFRS 15. Contract milestones have been identified as the performance obligations for revenue recognition and are at a point in time. Revenue on contracts that do not separately identify milestones are recognised on completion. Most customer contracts with UKAEA allow for invoices to be raised once contract milestones have been completed. Revenue is measured based on the consideration set out in the customer contract. Revenue recognition before the implementation of IFRS 15 was based on a percentage-of-completion method.

ACCOUNTS

(b) Rental income

Rental income from investment properties is recognised in the statement of comprehensive income on a straight-line basis over the term of the lease. Lease incentives granted are recognised as an integral part of the total rental income over the term of the lease. This departure from the specified treatment in the FReM has been agreed with HM Treasury.

Capital grants from UKAEA's sponsoring department are recognised as financing and credited to reserves in line with the FReM.

(c) Grant-in-aid

Grant-in-aid relating to revenue expenditure is recognised in the statement of comprehensive income in the same period as the related expenditure that it is intended to fund.

This departure from the specified treatment in the FReM has been agreed with HM Treasury.

Capital grants from UKAEA's sponsoring department are recognised as financing and credited to reserves in line with the FReM.

3.4 Research expenditure

Expenditure on research activities, undertaken with the prospect of gaining new scientific or technical knowledge and understanding, is recognised in the statement of comprehensive income when incurred.

3.5 Employee benefits

(a) Short-term employee benefits

Short-term employee benefits are recognised in the year in which the related service is provided. A liability is recognised for the amount expected to be paid under short-term bonus arrangements if the Group has a present legal or constructive obligation to pay this amount as a result of past service provided by employees and the obligation can be estimated reliably.

(b) Termination benefits

Termination benefits are payable when employment is terminated by the Group before the normal retirement date, or whenever an employee accepts voluntary redundancy in exchange for these benefits. The Group recognises termination benefits when it is demonstrably committed to either: terminating the employment of current employees according to a detailed formal plan without possibility of withdrawal; or providing termination benefits as a result of an offer made to encourage voluntary redundancy. Benefits falling due more than 12 months after the reporting date are discounted to their present value.

(c) Retirement benefits

Obligations for contributions to defined contribution schemes are recognised as an expense when they are due. The Group has no further payment obligations once the contributions have been paid.

The Group operates three defined benefit schemes for the benefit of its employees. Two of these are closed to new members. The schemes are unfunded multi-employer defined benefit schemes. In accordance with the FReM, these schemes are accounted for as defined contribution schemes in these financial statements and the obligations recognised are limited to the contributions due.

The Group also has a separate liability in respect of unfunded retirement benefits relating to three individuals. The liability recognised in the statement of financial position is the present value of the defined benefit obligation at the reporting date, together with adjustments for unrecognised past-service costs. The defined benefit obligation is calculated annually by independent actuaries using the projected unit credit method. The present value of the defined benefit obligation is determined by discounting the estimated future cash outflows using a real rate of interest set by HM Treasury. Actuarial gains and losses arising from experience adjustments and changes in actuarial assumptions are charged or credited to equity in the period in which they arise.

ACCOUNTS

3.6 Segment reporting

Operating segments are reported in a manner consistent with the internal reporting provided to the chief operating decision-maker. The chief operating decision-maker, who is responsible for allocating resources and assessing performance of the operating segments, has been identified as the UKAEA Board.

3.7 Foreign currency translation

Transactions in foreign currencies are translated to the functional currency of the Group using the exchange rates at the dates of the transactions. Monetary assets and liabilities denominated in foreign currencies at the reporting date are retranslated to the functional currency using the exchange rates at that date. Foreign exchange gains and losses resulting from the settlement of transactions and from the translation of monetary assets and liabilities are recognised in the statement of comprehensive income except when deferred in taxpayers' equity as qualifying cash flow hedges.

3.8 Property, plant and equipment

Land and buildings are occupied by the Group and are shown at fair value, based on periodic, but at least quinquennial, valuations by external independent valuers, less subsequent depreciation for buildings. In the intervening years, these valuations may be updated by the Group with the assistance of independent advice as required. A valuation of all the properties was carried out in February 2020.

Fair value is based on market values for existing use as there are no alternative uses for the land and buildings. Where this basis is not applicable because of the specialised nature of the asset, valuations are carried out on a depreciated replacement cost basis.

Increases in the carrying amount arising on revaluation of land and buildings are credited to the revaluation reserve. Decreases that offset previous increases of the same asset are charged against the revaluation reserve; all other decreases are charged to the statement of comprehensive income. Each year the difference between depreciation based on the revalued carrying amount of the asset charged to the income statement and depreciation based on the asset's original cost is transferred from the revaluation reserve to retained earnings.

In accordance with the FReM, other classes of property, plant and equipment with short useful lives or low book values are stated at historical cost less depreciation as a proxy for current valuations. Subsequent costs are included in the asset's carrying amount or recognised as a separate asset, as appropriate, only when it is probable that future economic benefits associated with the item will flow to the Group and the cost of the item can be measured reliably. All other repairs and maintenance are charged to the statement of comprehensive income during the financial period in which they are incurred.

Property, plant and equipment that has been funded by the European Commission in respect of the Joint European Torus has been recognised in the Statement of Comprehensive Income during the financial periods it was incurred.

Land is not depreciated. Assets under construction are not depreciated until they are in use. Depreciation on other assets is calculated using the straight-line method to allocate their cost or revalued amounts to their residual values over their estimated useful lives, as follows:

–	Buildings	up to 40 years
–	Plant, machinery and equipment	up to 10 years

The assets' residual values and useful lives are reviewed, and adjusted if appropriate, at each reporting date.

Property, plant and equipment may have component parts with different useful lives. In accordance with the provisions of IAS 16 - Property, Plant and Equipment, each part of any newly recognised item of property, plant and equipment with a cost that is significant in relation to the total cost of the item is depreciated separately.

ACCOUNTS

An asset's carrying amount is written down immediately to its recoverable amount if the asset's carrying amount is greater than its estimated recoverable amount (Note 3.11).

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and any amounts to be released from deferred income on disposal and are recognised in the statement of comprehensive income. When revalued assets are sold, any amounts included in the revaluation reserve are transferred to retained earnings.

3.9 Investment property

Investment property, comprising freehold land and buildings, is held either for rental yields or capital appreciation and is not occupied by the Group. Investment property is carried at fair value, representing open market value determined annually by external independent valuers.

Fair value is based on active market prices, adjusted, if necessary, for any difference in the nature, location or condition of the specific asset. In the absence of current prices in an active market, the valuations are prepared by considering the aggregate of the estimated cash flows expected to be received from renting out the property. Valuations reflect the allocation of maintenance and insurance responsibilities between the Group and the lessee and the remaining economic life of the property.

Changes in fair values are recognised in the statement of comprehensive income.

3.10 Intangible assets

Intangible assets comprise acquired computer software licences and are stated at cost, net of amortisation and any provision for impairment. The cost of intangible assets, less estimated residual value, is amortised on a straight-line basis over their estimated useful lives of up to five years.

3.11 Impairment of non-financial assets

Assets that are subject to depreciation or amortisation are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and value in use. For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows. Non-financial assets that suffered impairment are reviewed for possible reversal of the impairment at each reporting date.

3.12 Inventories

Inventories are stated at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. The cost of work in progress comprises raw materials, direct labour, other direct costs and related production overheads. Net realisable value is the estimated selling price in the ordinary course of business, less applicable selling expenses.

3.13 Cash and cash equivalents

Cash and cash equivalents include cash in hand, deposits held at call with banks and other short-term highly liquid investments with original maturities of three months or less.

3.14 Current and deferred income tax

The tax charge or credit for the period comprises current and deferred tax. Tax is recognised in the income statement, except to the extent that it relates to items recognised directly in equity. In this case, the tax is also recognised in equity.

Current tax is the expected tax payable or receivable on the taxable income for the year, using tax rates enacted or substantially enacted at the reporting date, and any adjustment to tax payable in respect of previous years.

ACCOUNTS

RDEC credits payable by HM Revenue and Customs are treated as tax credits in line with the provisions of IAS12 and disclosed separately in the income statement.

Deferred tax is recognised, using the liability method, on temporary differences arising between the tax bases of assets and liabilities and their carrying amounts in the consolidated financial statements. Deferred tax is determined using tax rates (and laws) that have been enacted or substantially enacted by the reporting date and are expected to apply when the related deferred tax asset is realised, or the deferred tax liability is settled.

Deferred tax assets are recognised only to the extent that it is probable that future taxable profit will be available against which the temporary differences can be utilised.

3.15 Financial instruments

From 1 April 2018, UKAEA has applied IFRS 9, whereby financial assets are classified in the following measurement categories: amortised cost, fair value through Other Comprehensive Income (FVOCI) and Fair Value through Profit and Loss (FVTPL). UKAEA's financial assets comprise trade and other receivables, investments and cash and cash equivalents, and are held at amortised cost.

Financial assets are included in current assets, except for maturities greater than 12 months after the reporting date which are classified as non-current assets.

UKAEA's credit risk is low (see Note 4c).

Under IFRS 9, financial liabilities are classified as held at amortised cost or at Fair Value through Profit and Loss. They are included in current liabilities, except for maturities greater than 12 months after the reporting date which are classified as non-current liabilities. The majority of UKAEA's financial liabilities relate to trade and other payables which are held at amortised cost.

AEAIL has also applied IFRS 9 from 1 April 2018.

3.16 Operating leases

Payments made under operating leases are recognised in the statement of comprehensive income on a straight-line basis over the term of the lease. Lease incentives are recognised as an integral part of the total lease expense over the term of the lease.

3.17 New and amended accounting standards

Certain new standards, amendments and interpretations to existing standards have been published but are not effective on UKAEA's accounting period.

The following new standards, amendments and interpretations to existing standards are not yet effective or are not yet effective in HMT's 2019/20 FReM and have not been early adopted by the Authority:

IFRS 16 – Leases (IAS 17 replacement – Leases) – effective date 1 January 2019, with adoption mandated in the FReM from 1 April 2021.

UKAEA does not meet the criteria for early adoption set out in the 2019/20 FReM.

IFRS 17 – Insurance Contracts (IFRS 4 replacement – Insurance Contracts) – effective date 1 January 2023.

The Board anticipate that the adoption of these standards and interpretations in future periods will have no material impact on the financial statements of the Authority. There is also no material impact on AEAIL.

ACCOUNTS

4 Financial risk management

Due to the nature of its activities, the Group is not exposed to the same degree of financial risk faced by other business entities. Financial instruments play a much more limited role in creating or changing risk and generally financial assets and liabilities are generated from day-to-day operational activities and not held to change the risks facing the Group in undertaking its activities. While the Group has significant financial liabilities relating to decommissioning and restructuring, most of the risks attached to these liabilities do not rest with the Group as they are broadly matched by reimbursement assets.

4.1 Foreign exchange risk

Foreign exchange risk arises when future commercial transactions or recognised assets or liabilities are denominated in a currency that is not the Group's functional currency. The Group operates internationally and is exposed to foreign exchange risk arising from various currency exposures, primarily with respect to the Euro.

4.2 Interest rate risk

As the Group has no borrowings or significant interest-bearing assets, the Group's income and operating cash flows are substantially independent of changes in market interest rates. Cash balances on deposit are held in highly rated fixed term deposits and the exposure to interest rate risk is minimal and appropriately managed.

4.3 Credit risk

The Group's income is received primarily from public sector bodies in the UK and Europe and the exposure to credit risk is therefore considered to be low.

4.4 Liquidity risk

The Group is primarily financed by income from other public sector bodies, in the UK and in Europe. Uncertainties about the timing and amount of some of this income, particularly income from Europe, expose the Group to liquidity risk. The Group has a facility to request temporary working capital funding from the Department for Business, Energy and Industrial Strategy should the need arise.

5 Segment information

As the majority of the Group's activities do not represent the provision of public services, segment information in accordance with IFRS 8 is included in these financial statements.

5.1 Reportable segments

The Group has two reportable segments, as described below, which are the Group's main business areas reported to the Authority Board. The business areas offer different services and are managed separately because they require different strategies and have different funding streams.

The following summary describes the operations in each of the Group's reportable segments:

- (a) Fusion research – research into using fusion to create a new source of energy that is safe and environmentally benign
- (b) Property management – management and development of the Culham and Harwell campuses for future scientific use

Other segments include grant-in-aid funding and insurance. None of these segments meets any of the criteria for determining reportable segments in 2019 or 2018. The results of these segments are included in the "other" column in the segmental analyses below.

ACCOUNTS

The segment information for the reportable segments for the years ended 31 March 2020 and 31 March 2019 is as follows:

	Fusion research £k	Property management £k	Other £k	Total £k
Year ended 31 March 2020				
External segment revenue	138,816	6,725	10,081	155,622
Less: Share of revenue of joint venture	–	(2,328)	–	(2,328)
Other income	374	2	179	555
Expenditure	(143,204)	(3,371)	(8,755)	(155,330)
Investment property revaluation	–	1,222	–	1,222
Operating profit/(loss)	(4,014)	2,250	1,505	(259)
Finance income	169	–	57	226
Finance expense	–	–	(83)	(83)
Profit on disposal of fixed assets	–	879	–	879
Share of profit/(loss) of joint venture	–	1,545	–	1,545
Profit/(loss) before income tax	(3,845)	4,674	1,479	2,308
Year ended 31 March 2019				
External segment revenue	102,714	7,618	6,434	116,766
Less: Share of revenue of joint venture	–	(3,139)	–	(3,139)
Other income	4,021	1	370	4,392
Expenditure	(107,542)	(3,970)	(6,970)	(118,482)
Investment property revaluation	–	(9,559)	–	(9,559)
Operating profit/(loss)	(807)	(9,049)	(166)	(10,022)
Finance income	88	–	58	146
Finance expense	–	–	(16)	(16)
Loss on disposal of fixed assets	–	(4)	–	(4)
Share of profit/(loss) of joint venture	–	4,582	–	4,582
Profit/(loss) before income tax	(719)	(4,471)	(124)	(5,314)

ACCOUNTS

Revenue from external parties is measured in a manner consistent with that in the statement of comprehensive income.

Reconciliation between Reportable Segments and Statement of Comprehensive Income

	2020 £k	2019 £k
Revenues		
Total revenue for reportable segments	155,067	110,332
Other revenue	555	6,434
Consolidated revenue per Statement of Comprehensive Income	155,622	116,766
Profit or loss		
Total (loss) / profit or loss for reportable segments	(1,441)	(5,190)
Other profit or loss	3,749	(124)
Consolidated (loss) / profit before income tax per Statement of Comprehensive Income	2,308	(5,314)

Geographical segments

In presenting information on the basis of geographical segments, segment revenue is based on the geographical location of customers.

	2020 £k	2019 £k
Group Revenue		
United Kingdom	99,577	53,783
Europe	55,511	61,976
Rest of the World	534	1,007
	155,622	116,766

Revenue from major customers

	2020 £k	2019 £k
European Commission	42,268	51,787

Income from the European Commission is attributable to the fusion research segment, the main component is the JET Operating Contract. Following the renewal of this contract, there are operating criteria which may result in the income coming from UK Government as well as European Commission in future.

ACCOUNTS

5.2 Disaggregation of revenue IFRS15 (Revenue from Contracts with Customers)

UKAEA derives its customer revenue from the transfer of goods and services at a point in time. This revenue is categorised within the fusion segment, total £13,981k.

Contract milestones have been identified as performance obligations under IFRS 15 and are fulfilled within twelve months.

Timing of revenue recognition

Contract milestones have been identified as the performance obligations for revenue recognition at a point in time. Revenue on contracts which do not have separately identifiable milestones is recognised at a point in time, on completion.

Most customer contracts provide for invoices to be raised and paid once contract milestones have been completed.

On first time adoption, UKAEA followed HM Treasury guidelines by using the practical expedient of identifying the outstanding performance obligations associated with contracts still open at 1 April 2018 and applying the retrospective transitional approach with the cumulative effect of restatement under IFRS 15 recognised as an adjustment to the opening balance of Taxpayers' Equity.

Contract balances

The following table provides information about receivables, contract assets and contract liabilities from contracts with customers.

	Note	2020 £k	2019 £k
Trade receivables	15	1,743	2,115
Contract assets	15	549	918
Contract liabilities	17	(19)	(197)

Contract assets primarily relate to the direct costs incurred on unsatisfied performance obligations and performance obligations satisfied but not yet invoiced.

Contract liabilities primarily relate to invoicing and consideration received in advance.

Significant changes in the contract assets and contract liabilities balances during the year are as follows:

	2020 £k	2019 £k	2020 £k	2019 £k
	Contract Assets	Contract Assets	Contract Liabilities	Contract Liabilities
Contract Assets /Liabilities at the beginning of the period	918	610	(197)	(231)
Contract assets for performance obligations satisfied but not yet invoiced	(369)	334	–	–
Contract liability for payments received in advance of the satisfaction of performance obligations	–	–	178	(197)
Changes in the measure of progress	–	(26)	–	231
Contract Assets / Liabilities at year end	549	918	(19)	(197)

ACCOUNTS

6 Staff costs and operating profit

6.1 Staff costs

Staff costs comprise:	2020 £k	2019 £k
Permanently employed staff:		
Salaries, bonuses and allowances	52,778	42,558
Social security costs	6,073	4,899
Pension costs – defined contribution plans (see below)	8,427	6,900
	67,278	54,357
Other staff	21,151	17,708
	88,429	72,065

Full details of UKAEA's pension schemes are given in the Remuneration Report. The total contributions paid by the Group to the CPS during the year were £8,402k (2019: £6,875k). The total contributions paid by UKAEA during the year to the SPPP were £25k (2019: £23k)

6.2 Operating profit

Operating profit has been arrived at after charging/(crediting):

	2020 £k	2019 £k
Change in fair value of investment property	(1,222)	9,559
Net foreign exchange losses/(gains)	(208)	82
Operating lease rentals – plant, machinery and vehicles	150	148
Non-cash items:		
– Depreciation, amortisation and impairment	2,386	1,942

7 Auditor's remuneration

The total remuneration of the Group's auditor, the National Audit Office, for services provided to the Group was:

Audit fees	2020 £k	2019 £k
UKAEA	68	70

Audit of subsidiary and joint venture

The audit fee paid to the auditors of AEAIL was £10k (2019: £9k). The audit fee paid to the auditors of HSIC PubSP, in which UKAEA has a share of one half, was £13k (2019: £13k). The audit fee paid to the auditors of HSIC LP, in which UKAEA has a share of one quarter via HSIC PubSP, was £59k (2019: £50k).

ACCOUNTS

8 Finance income and expense

	Group		Authority	
	2020 £k	2019 £k	2020 £k	2019 £k
Profit/(loss) for the year				
Interest on term bank deposits	226	146	169	88
Expense				
Revalorisation of provisions:				
- Unwinding of discount	662	(4,516)	662	(4,516)
- Adjustments to reimbursement receivables	(685)	4,444	(685)	4,444
Interest on unfunded retirement benefits	(60)	56	(60)	56
	(83)	(16)	(83)	(16)

Full details of provisions and the discount rates used are provided in Note 20.

9 Analysis of net income

	Group	
	2020 Total £k	2019 Total £k
Income		
Income from activities	141,641	109,536
Contracts with customers	13,981	7,230
Other income	555	4,392
Interest receivable	226	146
Share of revenue of joint venture	(2,328)	(3,139)
Share of profit/(loss) of joint venture	1,545	4,582
	155,620	122,747
Expenditure		
Raw materials and consumables	36,288	23,547
Other external expense	45,315	35,322
Staff costs	88,429	72,065
Other expense	(224)	1,679
Cost charged to provisions	(345)	(584)
Costs capitalised	(16,517)	(15,489)
Revaluation adjustment	(1,222)	9,559
Non-cash items:		
– Depreciation and impairment	2,384	1,942
– Finance expense	83	16
– Loss on fixed asset disposal	(879)	4
	153,312	128,061
Net income after interest and before tax	2,308	(5,314)

ACCOUNTS

10 Income tax (expense)/credit

	Group and Authority	
	2020 £k	2019 £k
Profit/(loss) for the year		
Current tax credit (RDEC)	4,528	3,730
Adjustments relating to previous years	(31)	(139)
	4,497	3,591
Deferred tax		
Origination and reversal of temporary differences	(867)	929
Recognition of deferred tax asset (Note 19)	319	1,115
	(548)	2,044
Total income tax (expense)/credit	3,949	5,635

UKAEA has adopted the Research and Development Expenditure Credit ("RDEC"), which replaced the previous R&D tax relief regime and became mandatory from 1 April 2016. The RDEC is beneficial for UKAEA and offsets any non-trading profits from property and other activities.

The current tax on the Group's profit before tax differs from the theoretical amount that would arise using the weighted average tax rate applicable to profits of the consolidated entities as follows:

	2020 £k	2019 £k
Profit/(loss) for the year	6,257	321
Income tax expense/(credit)	(3,949)	(5,635)
Profit/(loss) excluding income tax	2,308	(5,314)
Tax calculated at the standard UK corporation tax rate of 19% (2018: 19%)	439	(1,010)
Tax effects of:		
– Reversal of timing differences	224	(137)
– Expenses not deductible	(399)	1,387
– R&D expenditure credit under s104A CTA 2009	1,062	875
– Brought forward losses set against trading profits	(744)	(1,053)
– Non-trading profits offset by RDEC credit	(444)	(260)
– Net RDEC claim 2019/20	(4,528)	-
– Net RDEC claim 2018/19	-	(3,730)
– Tax losses for which no deferred income tax asset was recognised	(137)	198
– Adjustments for previous periods	30	139
Current tax expense/(credit) for the year	(4,497)	(3,591)

The income tax charged/(credited) to equity during the year is as follows:

	2020 £k	2019 £k
Fair value gains on property, plant and equipment	903	(227)

11 Property, plant and equipment

Group and Authority	Land £k	Buildings £k	Plant and equipment £k	Assets under construction £k	Total £k
Cost or valuation					
At 31 March 2018	12,051	22,286	9,013	11,372	54,722
Additions	-	-	485	15,488	15,973
Disposals	-	-	(90)	-	(90)
Revaluation	(643)	227	-	-	(416)
Transfers within property plant and equipment	-	-	830	(830)	-
Transfer to investment property	-	(86)	-	-	(86)
At 31 March 2019	11,408	22,427	10,238	26,030	70,103
Additions	-	22	1,062	17,388	18,472
Disposals	-	(132)	(81)	-	(213)
Revaluation	2,423	(31)	-	-	2,392
Transfers within PPE	-	12,957	4,989	(17,946)	-
Transfer to investment property	-	619	-	(2,829)	(2,210)
At 31 March 2020	13,831	35,862	16,208	22,643	88,544

Depreciation and impairment

At 31 March 2018	-	(5,046)	(4,174)	-	(9,220)
Depreciation charge	-	(919)	(1,024)	-	(1,943)
Disposals	-	-	86	-	86
Transfer to investment property	-	38	-	-	38
At 31 March 2019	-	(5,927)	(5,112)	-	(11,039)
Depreciation charge	-	(1,018)	(1,368)	-	(2,386)
Disposals	-	132	81	-	213
Transfer to investment property	-	-	-	-	-
At 31 March 2020	-	(6,813)	(6,399)	-	(13,212)
Net book value					
At 31 March 2019	11,408	16,500	5,126	26,030	59,064
At 31 March 2020	13,831	29,049	9,809	22,643	75,332

All property, plant and equipment are owned by the Group.

New buildings along with elements of land and buildings that have changed circumstances during the year have been revalued as at 28 February 2020. The valuations were undertaken by Carter Jonas in accordance with the Valuation Standards of the Royal Institute of Chartered Surveyors, IFRS and guidelines in HM Treasury's FReM.

The valuation point coincided with the start of the COVID-19 pandemic in the UK and related lockdown and is reported on the basis of 'material uncertainty'. The Royal Institution of Chartered Surveyors (RICS), have advised that valuations within this period should be on the basis of 'material uncertainty' as per VPS3 and VPGA 10 of the RICS Red Book Global. Consequently, less certainty – and a higher degree of caution – should be attached to this valuation than would normally be the case.

The Group again reviewed the appropriateness of valuations in light of RICS guidance at the end of June 2020. Key factors in that assessment were that the land & buildings are all held for long term use, high occupancy and the reliance on direct replacement cost – with a significant proportion only recently constructed.

The Group determined that the valuations were still appropriate as at the valuation date and the reporting date.

The additions during the year include expenditure on the Oxfordshire Apprentice Scheme (OAS) facilities which opened during the year, progress on major programmes including STEP, NFTP and RACE. For further information on these major programmes, please see the Performance Report.

The group will keep the valuation of this property under review.

The net book value under the historical cost model at 31 March 2020 relating to classes subject to revaluation: Land £133k and Buildings £22,870k.

There was £7,600k capital expenditure contracted for at the reporting date but not recognised in the financial statements (2019: £4,962k). This related mainly to assets in course of construction.

ACCOUNTS**12 Investment property**

	Group and Authority	
	2020 £k	2019 £k
At 1 April	50,520	60,030
Change in fair value	1,222	(9,558)
Net transfer from property, plant and equipment	(95)	–
Impairment	2,210	48
At 31 March	53,857	50,520

Investment properties were valued at fair value at 28 February 2020 by independent valuers. The valuations were undertaken by Carter Jonas in accordance with the Valuation Standards of the Royal Institute of Chartered Surveyors, IFRS and guidelines in HM Treasury's FReM.

The valuation point coincided with the start of the COVID-19 pandemic in the UK and related lockdown and is reported on the basis of 'material uncertainty'. The Royal Institution of Chartered Surveyors (RICS), have advised that valuations within this period should be on the basis of 'material uncertainty' as per VPS3 and VPGA 10 of the RICS Red Book Global. Consequently, less certainty – and a higher degree of caution – should be attached to this valuation than would normally be the case.

The Group again reviewed the appropriateness of valuations in light of RICS guidance at the end of June 2020. Key factors in that assessment included the stability and mix of the tenant base, the proportion subject to contractual valuation, the long term nature of the property holdings (within the Culham Campus and at Harwell), the growth and current outlook for these R&D sectors, within two of the UK's leading research and innovation campuses. The Group determined that the valuations were still appropriate as at the valuation date and the reporting date.

The group will keep the valuation of this property under review.

2019, Most of the reduction in fair value was at Harwell and was due to revaluations of some of UKAEA's land holdings, and also the drawdown of land by the Harwell Joint Venture (Note 13.2).

The net book value under the historical cost model at 31 March 2020 relating to investment property subject to revaluation is £16,465k.

Investment properties are held for their investment potential. Rental income from tenants outside the Group is negotiated at arm's length. The following amounts have been recognised in the income statement:

	Group and Authority	
	2020 £k	2019 £k
Rental income	2,420	2,400
Direct operating expenses:		
– Investment properties that generated rental income	1,849	1,712
– Investment properties that did not generate rental income	354	364

ACCOUNTS**13 Financial assets**

	Group		Authority	
	2020 £k	2019 £k	2020 £k	2019 £k
Non-current				
Movements during the year				
At 1 April	49,689	32,986	18,623	16,723
Investment in joint venture	–	1,900	–	1,900
Revaluation	1,899	14,803	–	–
	51,588	49,689	18,623	18,623
Total non-current assets				
Investment in subsidiary undertakings	–	–	3,000	3,000
Investment in joint venture	51,588	49,689	15,623	15,623
	51,588	49,689	18,623	18,623
Current				
Term bank deposits	5,599	6,811	–	–
	5,599	6,811	–	–

13.1 Investment in subsidiary undertakings

Name	Country of incorporation	Ownership interest %	
		2020	2019
AEA Insurance Limited	Isle of Man	100	100

All subsidiary undertakings are included in the consolidation. The proportion of voting rights in the subsidiary undertakings held directly by the Group does not differ from the proportion of shares held.

Registered office:
AEA Insurance Limited
1st Floor, Goldie House
1-4 Goldie Terrace
Upper Church Street
Douglas
Isle of Man
IM1 1EB

ACCOUNTS

13.2 Investment in joint venture

The Group has 50% control of a joint venture, Harwell Science and Innovation Campus Public Sector Limited Partnership (HSIC PubSP), the public sector partner in Harwell Oxford, which is responsible for the development of the Harwell Oxford Campus. The interest in the joint venture is accounted for using the equity method in the Group financial statements.

	Group	
	2020 £k	2019 £k
At 1 April	49,689	32,986
Investment in joint venture	–	1,900
Share of profit/(loss) net of tax	1,545	4,582
Revaluation	354	10,221
	51,588	49,689
Analysed as follows:		
Cost or valuation	32,236	31,882
Share of retained profits/(losses)	19,352	17,807
	51,588	49,689

The £1,545k share of profit of the joint venture (2019: profit of £4,582k) represents UKAEA's share of the operating profit of Harwell Oxford via HSIC PubSP and was largely due to revaluation adjustments. The increase in investment compared with the previous year was mainly due to a higher share of non-current assets in the joint venture and related to Harwell Oxford investment properties and assets under construction.

The following amounts represent the Group's share of the income, results, assets and liabilities of the joint venture. They are included in the Statement of Comprehensive Net Income and Statement of Financial Position:

	2020 £k	2019 £k
Profit/(loss) net of tax		
Income	2,328	5,492
Expenses	(783)	(910)
	1,545	4,582
Assets		
Current assets	24,507	25,372
Non-current assets	52,330	49,862
	76,837	75,234
Liabilities		
Current liabilities	507	1,329
Non-current liabilities	24,742	24,216
	25,249	25,545
Net assets	51,588	49,689

There are no contingent liabilities relating to the Group's interest in the joint venture, and no significant contingent liabilities of the venture itself.

Within current/non-current assets there is £43.1m of investment properties (2018/19: £40.4m). The investment properties have been valued at market value, as at 31 March 2020 using information provided by Lambert Smith Hampton, independent chartered surveyors. The valuation was carried out in accordance with the provisions of RICS definition of Market Value, except for Building 150 where a lower Directors' valuation was adopted to reflect the remaining costs of completion.

The valuation point coincided with the start of the COVID-19 pandemic in the UK and related lockdown and is reported on the basis of 'material uncertainty'. The Royal Institution of Chartered Surveyors (RICS), have advised that valuations within this period should be on the basis of 'material uncertainty' as per VPS3 and VPGA 10 of the RICS Red Book Global. Consequently, less certainty – and a higher degree of caution – should be attached to this valuation than would normally be the case.

The Group noted that the Joint Venture accounts are in the final stages of audit and not yet approved by the HSIC board. The Group again reviewed the appropriateness of valuations in light of RICS guidance at the end of June 2020. Key factors in that assessment included the stability and mix of the tenant base, occupancy, the growth and current outlook for these R&D sectors within one of UK's leading research and innovation campuses. The Group determined that the valuations were still appropriate as at the valuation date and the reporting date.

The group will keep the valuation of this property under review.

Annual accounts including the full investment property disclosure note can be requested from the registered office below:

Registered office:
Harwell Science and Innovation Campus Public Sector Limited Partnership
c/o Science and Technology Facilities Council UK Astronomy Centre
Royal Observatory Edinburgh
Blackford Hill
Edinburgh
EH9 3HJ

13.3 Term bank deposits

Term bank deposits are held with major UK banks. The average interest rate on the deposits held at 31 March 2020 was 0.70% (2019: 0.97%). The credit risk associated with these investments is considered to be low because of the size and status of the banks involved.

14 Financial instruments

From 1 April 2018, UKAEA has applied IFRS 9 (see Note 3.15). Term deposits (Note 13.3) are solely payments of principal and interest and are therefore held at amortised cost. With the exception of UKAEA's interest in its subsidiary and joint venture (Notes 13.1 and 13.2), which are exempted from the application of IFRS 9, all other financial assets of the Group were held at amortised cost at both 31 March 2020 and 31 March 2019. All financial liabilities of the Group were held at amortised cost at both 31 March 2020 and 31 March 2019.

The majority of financial instruments relate to contracts to buy non-financial items in line with the UKAEA's expected purchase and usage requirements and UKAEA is therefore exposed to little credit, liquidity or market risk.

15 Trade and other receivables

	Note	Group		Authority	
Amounts falling due after more than one year:		2020 £k	2019 £k	2020 £k	2019 £k
Reimbursement receivables:	20				
- Site restoration		425,472	420,258	425,472	420,258
- Restructuring		36,971	38,446	36,971	38,446
Corporation Tax		4,528	–	4,528	–
		466,971	458,704	466,971	458,704
Amounts falling due within one year					
Trade receivables		5,498	3,879	5,498	3,879
Reimbursement receivables:	20				
- Site restoration		–	1,529	–	1,529
- Restructuring		3,265	3,261	3,265	3,261
Prepayments and accrued income		17,287	12,761	17,262	12,738
Contract asset	5.2	549	918	549	918
VAT		3,321	1,280	3,321	1,280
Corporation Tax		3,700	7,136	3,700	7,136
Other receivables		32	35	1,285	215
		33,652	30,799	34,880	30,956

There are no impaired assets in any of the classes of trade and other receivables. UKAEA has calculated an Expected Credit Loss for its trade receivables in accordance with the requirements of IFRS 9. This is £17k.

The reimbursement receivables have been discounted at the rates applicable to the provisions to which they relate. Further details of these rates are disclosed in Note 20.

ACCOUNTS**16 Cash and cash equivalents**

	Group		Authority	
	2020 £k	2019 £k	2020 £k	2019 £k
At 1 April	57,393	37,116	56,162	35,194
Net change in cash and cash equivalent balances	3,062	20,277	2,077	20,968
	60,455	57,393	58,239	56,162

The following balances were held at 31 March:

Commercial banks and cash in hand	60,455	57,393	58,239	56,162
	60,455	57,393	58,239	56,162

17 Trade and other payables

	Note	Group		Authority	
		2020 £k	2019 £k	2020 £k	2019 £k
Amounts falling due within one year					
Trade payables		2,955	1,613	2,955	1,613
Accrued costs		21,792	15,155	21,778	15,146
Payments received on account		32,032	33,171	32,032	33,171
Contract liabilities	5.2	19	197	19	197
Social security and other taxes		2,034	1,464	2,034	1,464
Other payables		1,446	1,054	1,446	1,055
		60,278	52,654	60,264	52,646

Amounts falling due after more than one year

Payments received on account	1,537	1,322	1,537	1,322
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18 Deferred income

The majority of UKAEA's deferred income relates to capital grants for the purchase of equipment for the Materials Research Facility and grants for the RACE building and new facilities for RACE.

	2020 £k	2019 £k
At 1 April	7,927	5,544
Deferred income received	3,170	2,647
Released to income statement	(348)	(264)
At 31 March	10,749	7,927

19 Deferred income tax

	Investment property £k	Land and buildings £k	Total £k
Deferred tax liability			
At 31 March 2018	7,404	4,728	12,132
Income statement debit/(credit):	(929)	–	(929)
- Revaluation			
Charged directly to equity:	–	(227)	(227)
- Revaluation			
At 31 March 2019	6,475	4,501	10,976

Movements during 2019/20:

Income statement debit/(credit):			
- Revaluation	105	–	105
- Change in tax rate	762	–	762
Charged directly to equity:			
- Revaluation	–	372	372
- Change in tax rate	–	530	530
At 31 March 2020	7,342	5,403	12,745

Deferred tax asset

At 31 March 2019		2,924
Increase/(decrease) in deferred tax asset		319
At 31 March 2020		3,243

Net deferred tax liability

At 31 March 2019	8,052
At 31 March 2020	9,502

Deferred tax liability

The UK corporation tax rate has been 19% since 1 April 2017. A reduction to 17% with effect from 1 April 2020 was enacted on 6 September 2016, and the deferred tax liability at 31/3/2019 was calculated at 17%.

During the year, the Government announced that the corporation tax rate would remain at 19% from 1 April 2020. This change was substantively enacted on 17 March 2020. UKAEA's deferred tax provision has therefore been recalculated at 19%.

Movements in the deferred tax provision relating to investment property are charged or credited to the income statement.

Movements in the provision relating to land and buildings are charged or credited to the revaluation reserve.

Deferred tax asset

Deferred income tax losses are recognised for tax depreciation and tax loss carry-forwards to the extent that the realisation of the related tax benefit through future taxable profits is probable. The adoption of the RDEC means that previous trading losses are brought into the annual corporation tax computation. UKAEA now therefore expects to utilise its remaining carried forward losses between 2020/21 and 2022/23. A deferred income tax asset of £1,519k has therefore been recognised in the Accounts, calculated at 19%, the tax rates expected to be in force in those years.

In addition, UKAEA has recognised a deferred income tax asset of £1,724k in respect of RDEC set-off amounts that can be carried forward against future taxable income. Under the RDEC rules, these can only be utilised after existing trading losses have been exhausted. It is now expected that UKAEA will utilise these in 2022/23.

The total deferred tax asset of £3,243k has been netted off UKAEA's deferred tax liability in the Accounts as it fulfils the conditions for offsetting in IAS12.

ACCOUNTS

20 Provisions for liabilities and charges

Group	Site restoration £k	Restructuring £k	Other £k	Total £k
At 1 April 2018	313,281	51,026	10,089	374,396
Changes in price levels	–	1,116	60	1,176
Unwinding of discount	(4,477)	47	(45)	(4,475)
Discount charge	(32,786)	–	–	(32,786)
Provided in the year	145,964	–	562	146,526
Provisions not required written back	–	(1,991)	–	(1,991)
Provisions utilised in the year	(195)	(3,608)	(906)	(4,709)
At 31 March 2019	421,787	46,590	9,760	478,137
Changes in price levels ⁽¹⁾	–	729	37	766
Unwinding of discount	(685)	125	9	(551)
Discount charge	7,027	–	–	7,027
Provided in the year ⁽¹⁾	–	1,406	–	1,406
Provisions not required written back	(2,446)	–	(2,502)	(4,948)
Provisions utilised in the year	(211)	(3,498)	(870)	(4,579)
At 31 March 2020	425,472	45,352	6,434	477,258

Note:

1. Site Restoration Provision is expressed in money values, as part of the recent review.

At 31 March 2019

Non-current	420,258	43,017	7,884	471,159
Current	1,529	3,573	1,876	6,978
	421,787	46,590	9,760	478,137

At 31 March 2020

Non-current	425,472	41,892	4,599	471,963
Current	–	3,460	1,835	5,295
	425,472	45,352	6,434	477,258

ACCOUNTS

20.1 Site restoration

The decommissioning provision represents the estimated costs of decommissioning the JET facility at UKAEA's Culham site, including the storage, processing and eventual disposal of radioactive wastes.

Calculation of the liabilities is based on the technical assessments of the processes and methods likely to be used in the future to carry out the work. Estimates are derived from the latest technical knowledge and commercial information available, considering current legislation, regulations and Government policy. Summary figures are built up by aggregating detailed estimates for individual liabilities. Allowance is also made for infrastructure costs, which are an appropriate share of site running costs and other overhead costs attributable to plant and buildings. The calculation is reassessed annually.

The detailed Lifetime Plan for decommissioning, funded by the Nuclear Decommissioning Authority (NDA), was originally drawn up in 2007/8. During 2018/19 financial year, the NDA carried out a detailed update to the Lifetime Plan, which included a refresh of assumptions including pricing, the site restoration provision at the 31 March 2019 represents this updated plan. This is the basis, together with high level assessment of changes, of the site restoration provision at the 31 March 2020.

The best estimate of the cost of dealing with the liabilities at 31 March 2020 is discounted to the reporting date at inflation and discount rates advised by HM Treasury. The rates are set out below.

	Time Period	Nominal discount rate	Implied inflation rate	Real terms discount rate	Equivalent rate in 2018/19
Short term	Up to and including 5 years	0.51%	2%	-1.48%	-1.33%
Medium term	Between 6 and 10 years	0.55%	2%	-1.44%	-0.95%
Long term	Between 11 and 40 years	1.99%	2%	-0.01%	-0.10%
Very long term	41 or more years	1.99%	2%	-0.01%	-0.10%

Cash flows which occur during the first year are assumed to be at present value and are not discounted or inflated.

The unwinding of discount in the year to March 2020 is the change in the provision from unwinding the previous year's estimated forward cash flows at the same rate as was used the previous year but bringing all the cash flows forward by one year. The discount charge for the year to 31 March 2020 represents the effect of changes in the discount rates as advised by HM Treasury in comparison to prior year rates, this is the difference between the current year's cash flows discounted at the current year's rates and the same cash flows discounted at the previous year's rates.

	Group and Authority	
	2020 £k	2019 £k
Not later than one year	–	1,529
Later than one year and not later than five years	9,167	126,391
Later than five years and not later than ten years	257,926	223,661
Later than ten years and not later than twenty years	158,379	70,206
Later than twenty years and not later than fifty years	–	–
	425,472	421,787

ACCOUNTS

The analysis of expected timing of discounted cash flows is as follows:

A later closure date for JET will mean the timing of cash flows moving into later years.

The increase in the provision compared with 2018/19 is mainly due to the assumed cessation of operations moving from 2020 to 2024 and the effects of the discount rates.

The real terms discount rate is sensitive to changes in inflation and nominal discount rates, as illustrated below:

	Group and Authority 2020 (£k)				
	Current rates	Inflation rates		Nominal discount rates	
		0.5% increase	0.5% decrease	0.5% decrease	0.5% increase
Not later than one year	–	–	–	–	–
Later than one year and not later than five years	9,167	9,284	9,050	9,287	9,049
Later than five years and not later than ten years	257,926	266,697	249,415	266,869	249,337
Later than ten years and not later than twenty years	158,379	167,855	149,403	167,903	149,446
	425,472	443,836	407,868	444,059	407,832

The best estimate of the undiscounted cost of dealing with the liabilities is £401,350k (2019: £402,189k). The best estimate of the discounted cost is £425,472k (2019: £421,787k). This figure includes a contingency, as illustrated below:

	P50 - 50% chance of actual costs being higher or lower £k	P80 - 80% chance of actual costs being lower £k
Undiscounted costs	401,350	447,406
Discounted costs	425,472	474,297

The best estimate (P50) value is supported by a statistical analysis of cost and estimation uncertainties, along with other discrete risks. The final value was reached by agreement between the UKAEA and the Nuclear Decommissioning Authority. The discounted cost of contingency is applied proportionally.

A letter issued by the then Secretary of State for Energy in 1986 stated that the Government was prepared to continue to accept responsibility in principle for those costs which UKAEA incurs in treating and disposing of nuclear wastes and in decommissioning plant arising from:

- (i) programmes carried out by UKAEA and its predecessors prior to 1 April 1986; and
- (ii) programme agreement work undertaken for BEIS and its predecessors after 1 April 1986.

These assurances were reconfirmed by BEIS in April 2020. On the basis of these assurances a matching receivable is included in the statement of financial position.

UKAEA has assessed the impact of the date of JET closure, which is a key variable, on the best estimate recognised in the 2019/20 Annual Accounts. A later JET closure date by 2 years, would decrease the discounted cost to £420,007k, due to a greater proportion of the spend profile being subject to the long-term discount rate provided by HM Treasury.

ACCOUNTS

20.2 Restructuring

The restructuring provisions represent termination benefits payable under early retirement arrangements to employees who had retired early, or had accepted early retirement, before 31 March 2020. These benefits continue at least until the date at which the employee would have reached normal retirement age, and in many cases part of the benefit is payable for life. The restructuring provisions are discounted to the reporting date at the discount rate for pension liabilities advised by HMT, which is (0.5)% in 2019/20 (2019: 0.29%). The undiscounted cost of the group provisions is £43,673k (2019: £47,639k) and the benefits are estimated to be payable over a period up to 35 years.

The analysis of the expected timing of discounted cash flows is as follows:

	Group and Authority	
	2020 £k	2019 £k
Not later than one year	3,460	3,573
Later than one year and not later than five years	13,279	13,598
Later than five years	28,613	29,419
	45,352	46,590

Part of the expenditure required to settle the restructuring liabilities will be reimbursed by other parties as follows:

- (i) Lump sums paid to employees on early retirement are refundable to the Group from the appropriate pension scheme at or after the date on which the individual concerned would have reached normal retirement age.
- (ii) Assurances covering restructuring provisions made before 1 April 2004 have been received from BEIS, and reconfirmed in May 2019, and expenditure related to these provisions is reimbursed by BEIS.

On the basis of these reimbursement arrangements, receivables have been included in the statement of financial position.

20.3 Other provisions

Provision of £1,331k has been made relating to the disposal of operational waste arising from UKAEA's previous contract to operate JET, which ended in December 2014. The provision was discounted at the Treasury rates for general provisions referred to in note 20(a) above. The undiscounted cost of the provision is £1,328k. In addition, UKAEA has made provision of £569k for the eventual decommissioning of the MRF at its Culham site. The remaining provisions mainly comprise unfunded retirement benefit obligations and claims relating to industrial-related injuries.

21 Operating leases

21.1 The Group as lessee

Non-cancellable operating lease rentals are payable as follows:

	2020 £k	2019 £k
Not later than one year	175	125
Later than one year and not later than five years	814	75
Later than five years	1,176	–
	2,165	200

UKAEA leases vehicles and office equipment under operating leases. AEAIL does not have operating leases.

ACCOUNTS**21.2 The Group as lessor**

UKAEA leases its investment property with lease terms of between 0.5 and 99 years. The leases contain market review clauses in the event that the lessee exercises the option to renew. The lessee does not have an option to purchase the property at the expiry of the lease period. AEAIL is not a lessor.

The future minimum lease payments under non-cancellable leases are as follows:

	2020	2019
	£k	£k
Not later than one year	2,254	2,079
Later than one year and not later than five years	4,438	4,684
Later than five years	30,659	31,309
	37,351	38,072

Rental income received during the year is disclosed in Note 12. The prior year comparative (2019 £5,030k) has been updated to include UKAEA property leases at Harwell.

22 Related party transactions

UKAEA is an NDPB sponsored by BEIS which is regarded as a related party.

During the year, UKAEA had various material transactions with BEIS and with other entities for which BEIS is regarded as the responsible department, in particular UKRI (EPSRC). UKRI (STFC) is UKAEA's partner in the Harwell Science and Innovation Campus Public Sector Limited Partnership (Note 13). Other material transactions took place with the Civil Nuclear Constabulary and the NDA, organisations within the BEIS Group.

No Board member, key manager or other related party has undertaken any material transactions with the Group during the year, except for remuneration as disclosed in the Remuneration and Staff Report.

23 Statutory borrowing limit

During 2019/20, the statutory borrowing limit set by Section 3 of the Atomic Energy Authority Act 1986 as amended by The United Kingdom Atomic Energy Authority (Limit on Borrowing) Order 1991 remained at £200m. There were no borrowings by UKAEA during the current or previous year.

24 Events after the reporting period date

In accordance with the requirements of IAS10 - Events After the Reporting Period, post Statement of Financial Position events are considered up to the date on which the Accounts are authorised for issue. This is interpreted as the same date as the date of the Certificate Report of the Comptroller and Auditor General.

GLOSSARY

AVC	Additional Voluntary Contribution	LGBT+	Lesbian, Gay, Bisexual, Transgender/Transsexual plus
AEAIL	AEA Insurance Ltd	LLW	Low Level Waste
AI	Artificial Intelligence	MDF	Material Detritiation Facility
BEIS	Department for Business, Energy and Industrial Strategy	MRF	Material Research Facility
CRC	Carbon Reduction Commitment Energy Efficiency Scheme	MAST-U	Mega Amp Spherical Tokamak Upgrade
CETV	Cash Equivalent Transfer Value	MTL	Materials Test Laboratory
CEO	Chief Executive Officer	MTF	Module Test Facility
CDT	Centre for Doctoral Training	NAO	National Audit Office
CPS	Combined Pension Scheme	NFTP	National Fusion Technology Platform
CCFE	Culham Centre for Fusion Energy	NNUF	National Nuclear Users Facility
DEMO	Demonstration fusion power station	NDPB	Non-Departmental Public Body
DT	Deuterium-Tritium campaigns	NDA	Nuclear Decommissioning Authority
EDI	Equality, Diversity & Inclusion	OAS	Oxfordshire Advanced Skills
EDS	Exhaust Detritiation System	OSR	Radioactive and Out of Scope of Regulations
ELMs	Edge Localised Modes	PPSS	Protected Persons Superannuation Scheme
EPSRC	Engineering and Physical Sciences Research Council	PNISS	Principal Non-Industrial Superannuation Scheme
ESS	European Spallation Source	RACE	Remote Applications in Challenging Environments facility
FReM	Government Financial Reporting Manual	R&D	Research & Development
FTE	Full Time Equivalent	RDEC	Research and Development Expenditure Credit
FTF	Fusion Technology Facilities	RoSPA	Royal Society for the Prevention of Accidents
H3AT	Hydrogen-3 Advanced Technology – tritium facility	STFC	Science & Technology Facilities Council
HMT	Her Majesty's Treasury	SIRO	Senior Information Risk Officer
HSIC	Public/private sector partnership for the Harwell joint venture	SPPP	Shift Pay Pension Savings Plan
PubSP/LP		ST	Spherical Tokamak
IAS	International Accounting Standards	STEP	Spherical Tokamak for Energy Production
IET	Institution of Engineering and Technology	STFC	Science and Technology Facilities Council
IFRS	International Financial Reporting Standards	TARM	Telescopic Articulated Robotic Manipulator
ILW	Intermediate Level Waste	WDS	Water Detritiation System
ITER	Next generation international experimental fusion reactor	UKAEA	UK Atomic Energy Authority
JET	Joint European Torus	UKRI	UK Research and Innovation
JOC	JET Operating Contract		

