



UK Atomic
Energy
Authority

Annual Report and Accounts 2020/21



United Kingdom Atomic Energy Authority
Annual Report and Accounts
2020/21

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CHIEF EXECUTIVE'S STATEMENT



"IN THE FIGHT TO ARREST CLIMATE CHANGE, FUSION CAN BE AN IMPORTANT PART OF A LOW-CARBON ENERGY PORTFOLIO, AND WE ARE LEADING THE CHARGE TO MAKE THIS A REALITY."

INTRODUCTION

The world has been gripped by the COVID-19 pandemic this year – economies brought to standstill, people forced into social isolation, and tragically, over three million people have lost their lives. It has taken a global collective endeavour to begin to turn the tide. COVID-19 has temporarily changed our world and will have lasting effects for many; however, an even bigger collective effort will be required to overcome climate change which remains the defining challenge of our generation. The amount of CO₂ in the atmosphere reached record levels this year, hitting 417 parts per million; the last time CO₂ levels were this high was around four million years ago when global temperatures were 2-4°C warmer and sea levels were 10-25 metres higher than now. As evidence of this astonishing shift in our climate, the temperature reached 38°C in eastern Siberia, the hottest ever recorded within the Arctic Circle. This is why the mission of the UK Atomic Energy Authority – to “lead the delivery of sustainable fusion power and maximise scientific and economic benefits” – is so essential. Fusion offers the promise of low-carbon, effectively-inexhaustible, continuous, sustainable power. In the fight to arrest climate change, fusion can be an important part of a low-carbon energy portfolio, and we are leading the charge to make this a reality.

Overcoming COVID-19 will only be possible with a vaccine programme rolled out globally, and so too must a global approach be taken to reducing carbon emissions to tackle climate change. Achieving net zero in one country cannot make an impact unless we

take collective responsibility. This spirit of collaboration pervades fusion, with the ITER project – the largest scientific collaboration ever undertaken by humankind – aiming to demonstrate fusion is possible on a commercial scale. The UK government has reached an association agreement to the Euratom Research and Training programme, which means that we will remain an active participant in the ITER project as well as a member of the EUROfusion consortium – the largest scientific consortium grant issued by the European Commission. ITER has met many milestones this year, including the completion of the tokamak building and the installation of the first machine components and the first magnetic coil, with approximately 40 UK companies playing critical roles.

Whilst ITER is being assembled in the south of France, we are preparing JET (Joint European Torus) for high-power operation with the deuterium-tritium fuel mix needed for fusion for the first time in 24 years. In doing so JET has run at high power with pure tritium plasmas for the first time in two decades, shedding new light on the operation of heating systems critical for ITER. JET has revolutionised fusion – it is the most capable device in the world and holds the world record for fusion power produced – but with ageing infrastructure and the start of ITER operation planned for 2025, JET must come to an end. This year the EU fusion community took the decision to cease JET operations at the end of 2023. This will be a sizeable change for UKAEA, and we are now

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planning in earnest for the decommissioning programme that will follow in the decade after operations end. At the same time, it offers huge opportunity to repurpose some of the £2bn worth of JET assets as well as benefitting from the world-leading capability within the only operations team in the world with experience of tritium, beryllium, and many other unique features.

One of the beneficiaries of this capability will be the UK's own fusion experiment, MAST (Mega Amp Spherical Tokamak) Upgrade. MAST Upgrade comprises 130,000 components, with 90% of the fabrication contracts placed in the UK supply chain. 20 magnets have been built, the largest over 4m in diameter, each containing 5000 components installed to sub-mm accuracy. The vessel interior is lined with 1000 graphite tiles to manage the extreme heat fluxes, cryo-pumped to ultra-low vacuum pressures. Finally, 120km of cabling, 2km of gas supply lines and over 1000 different diagnostics enable sophisticated control of the plasma – a soup of ions and electrons formed from a super-heated gas controlled by magnetic fields - which is thinner than air. After seven years of assembly and commissioning, this year saw the first operations of this new facility which is at the vanguard of understanding how to exhaust extreme heat loads present in fusion powerplants. MAST-U includes a world-first and utterly unique exhaust system, which has already shown a factor of 20 improvement in the heat management – consistent with modelling that fed into the design of the device and a truly remarkable result. In order to exploit the full capability of this unique

device we are already well underway with a series of enhancements which will greatly increase the performance and measurement capability of MAST-U.

MAST Upgrade is our third-generation so-called 'spherical tokamak' – a compact fusion device pioneered in the UK and the US which offers the potential of smaller, cheaper powerplants. Having built the first ever high temperature spherical tokamak and showed its potential with much more efficient magnetic confinement of the plasma, in MAST Upgrade we have now taken the first steps towards a plausible route to exhausting the power from a compact fusion powerplant. This increases our confidence to pursue a smaller powerplant design. We are making considerable progress in our design of STEP (Spherical Tokamak for Energy Production), which aims to produce net electricity from fusion at lower capital cost, with the team now involving more than 350 people and many industry partners. This year we received 15 nominations to become the site for STEP showing the widespread community interest in helping to deliver fusion power.

The organisation continues to grow at unprecedented rates as we expand our capabilities needed to meet our mission. Our robotics centre, RACE (Remote Applications in Challenging Environments), has been extended and now has 250 roboticists. This year we secured a £12m collaborative project between the UK and Japan to develop robots for decommissioning, led by UKAEA as a collaboration between four partners. Our Materials Research Facility, MRF, is

INTRODUCTION

also being extended and we have secured a further £10m of equipment to expand our capability. Finally, we have completed the steelwork for a new centre housing the largest civil tritium research facility in the world, H3AT (Hydrogen-3 Advanced Technology), whilst we opened our new Fusion Technology Facility in Yorkshire with the assembly of its cornerstone magneto-thermal-hydraulic testing rig – called CHIMERA - to begin imminently.

As well as growth in our technical capabilities, we are renewing and expanding our enabling infrastructure. A major building programme at our Culham campus is underway and we have invested in a substantial uplift in our digital infrastructure. Although we already have 38 tenants employing 1,250 people co-located with us, we are now building new space for additional tenants to transform Culham into the heart of a global cluster for fusion research; this year we agreed that one of the biggest private fusion companies in the world, General Fusion from Canada, will locate their next demonstration facility at Culham. We have embarked upon a Fusion Industry Programme to fund industrial partners to tackle some of fusion's key technical challenges. Finally, our apprentice training centre, OAS (Oxfordshire Advance Skills), is now able to train up to 350 learners for us and over 20 partners and we will be expanding this to train over 1000 by 2025.

We are only able to achieve all that we have this year because of our people. Our people have a common ambition to change the world and deliver the sustainable low-carbon power

that we need to address our generation's defining challenge. This year we welcomed our 2000th member of the team, amongst which were four new Directors: Steve Wheeler as Director for Fusion Technology, Andrew Kirk as Director of Tokamak Science, Amanda Quadling as Director of Materials and Paul Methven as Director of STEP, whilst Rob Buckingham, our Director of RACE, was honoured with an OBE. During 2020 our people have shown incredible resilience, ingenuity and agility to remain operational but do so in a safe and COVID-19 secure fashion, enabling us to meet all of our critical milestones. It is the innovation, commitment and collaboration of our people to overcome challenges put in front of them that defines our organisation, and only through them can we meet our audacious mission. The UN Secretary General, Antonio Guterres, said this year of the climate crisis that "Human activities are at the root of our descent towards chaos. But that means human action can help solve it." It is precisely the actions of our people that are putting us on the pathway to deliver fusion power.



Ian Chapman
Chief Executive and Accounting Officer
15th July 2021

CHAIR'S STATEMENT

"FOR MANY DECADES, THE UK ATOMIC ENERGY AUTHORITY HAS BEEN AT THE GLOBAL FOREFRONT IN DEVELOPING SCIENCE AND TECHNOLOGY FOR FUSION ENERGY"

Solving global challenges often requires radical innovation. The UK's science and innovation-led response to COVID-19 resulted in a global vaccine and recovery treatments. In contrast, many countries relied on traditional policy and procurement approaches and were unable to contribute new solutions to ending the pandemic.

The enduring challenge of climate change requires a similar science and innovation approach. For many decades, the UK Atomic Energy Authority has been at the global forefront in developing science and technology for fusion energy, driven by pioneering research and unique operational knowhow. This year, we took major steps in leading the delivery of sustainable fusion energy, with new investment in scientific and engineering capability, facilities, training, and partnerships with industry and academia.

In my time as Chair, the Authority has grown by nearly 40% in headcount to provide the skills and capability needed to deliver our exciting new programmes such as STEP and Fusion Foundations, with an enduring culture of delivery benefitting from an increasingly diverse workforce, united by a desire to solve the world's greatest challenge. This growth is founded on a rich legacy: two decades of leadership in the development of compact spherical tokamak technology, alongside unique experience from operating the world's foremost tokamak - JET, the Joint European Torus.



This experience enabled the development of the STEP programme, with its ground-breaking concept design for a prototype powerplant. At the same time UKAEA broadened its support for industry by investing in new facilities and piloting a programme to fund innovation in the private sector at Culham.

The challenges of managing large, complex, and unique experimental facilities alongside a vibrant research programme and burgeoning infrastructure development were amplified by the COVID-19 pandemic. The Authority's excellent safety culture and leadership,

INTRODUCTION

coupled with resilience, adaptability, and a willingness to solve problems have made the year a success. This is evidenced by major breakthroughs with new performance records set on JET and a global first in the innovative super-X divertor, proven to be capable of reducing excess heat loads to tolerable levels for a power plant. Beyond fusion, our teams made valued contributions to the national effort by providing equipment and capabilities to support the nations response to the pandemic.

To achieve these results in normal times would be impressive. To deliver them whilst operating through the pandemic demonstrates the UKAEA's extraordinary capabilities and leadership. Thank you to everyone for playing their part and thank you to the leadership team for guiding the organisation to success in such challenging circumstances. We extend our gratitude to our partners, collaborators, and suppliers who have adapted swiftly to new working practices.

In May 2020 we warmly welcomed four new Non-Executive Directors to the UKAEA Board - Lady Eithne Birt, Mark Bayley, Luc Bardin, and Stephen Barter. In July 2020, Kay Church from the Met Office joined the Board as part of the Open Boards Scheme. I applaud our new members for quickly embedding themselves in the complex work of the Board and expanding its capability to support the delivery of the Authority's mission, despite only meeting virtually throughout the year.

I thank the Board for supporting the Executive in guiding the organisation through a uniquely challenging year. I am particularly grateful for the valuable contributions from Chris Theobald and Sue Scane, who completed their terms of office on the Board. Chris chaired the Board Assurance Committee, providing deep insight into the safe management of complex, largescale engineering activities. Sue provided valuable knowledge on local planning and development, and championed the Authority's Equality, Inclusivity and Diversity initiatives.

Looking to next year, we will continue to focus on the health and wellbeing of our people, seeking to embed the positive aspects of remote working whilst supporting a return to working in our facilities. We are excited to launch the first experimental campaign on MAST-U, the largest high power fusion campaign in JET's history, and our portfolio of programmes to support development of sustainable fusion energy.

Professor David Gann, CBE
Chair
July 2021

AT A GLANCE

Financial

27% growth

Performance

79% achieved

Funding from income and capital investments increased **+27%**



Highlights

April 2020



The Fusion Foundations programme to enhance infrastructure, facilities, and skills to enable world leading fusion in the UK begins



July 2020



The C38 experimental campaign begins on JET, achieving record breaking results



Sept 2020



The UKAEA Rotherham facility opens its doors



People

24% growth

Resourcing of new programmes has increased our capacity & capability, with 24% growth in average number of staff

Oct 2020



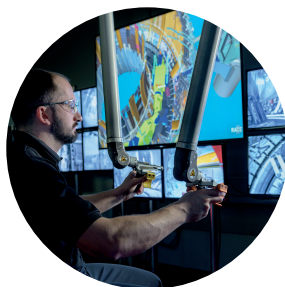
The new MAST Upgrade device achieves its first plasma discharge



Jan 2021



The 'LongOps' UK-Japanese collaboration is announced to explore robotics for fusion and nuclear decommissioning



Feb 2021



MAST Upgrade produces first promising results from the innovative new 'Super-X divertor'



March 2021



Competition to host the site of STEP closed to nominations with excellent response



MISSION AND STRATEGY

Mission

To lead the delivery of sustainable fusion energy and maximise scientific and economic benefit

Performance

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 by building strong international partnerships, an ambitious domestic fusion programme and supporting a thriving private sector. All of our activities are underpinned by globally unique facilities on our sites in Oxfordshire and Yorkshire, and a vibrant, diverse, and talented workforce supported by a commitment to skills growth and development.

Strategic goals

UKAEA's strategy is founded on three pillars of international leadership, scientific leadership, and commercial leadership in sustainable fusion energy. To drive the advancement of this strategy UKAEA has developed four overarching strategic goals:

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

VALUES AND PRINCIPLES

Principles

It is not just our goals that matter – the way we get there is also important. UKAEA is committed to the principles of:

Safety - The safety and well-being of our people is our priority and a leadership commitment, with strong safety standards and management underpinning everything that we do.

Equality of opportunity – Our mission needs diversity of thought and people who are representative of society; we are committed to fostering diverse and inclusive workforce and culture with visible leadership and ‘ground up’ participation.

Environmental sustainability – We are fully committed to developing low-carbon sustainable fusion energy as a key part of a future energy portfolio and to implementing the principles of environmental sustainability in the way in which we operate.

Responsible management of public funds – We acknowledge the privilege of receiving public money to develop fusion energy and are committed to using our resources carefully with accountability.

Working with business – Strong and effective public-private partnerships will be an essential part of developing sustainable fusion energy and we are committed to working collaboratively with partners to deliver our mission.

Values

As we work towards our challenging and ambitious mission and goals, guided by our principles, we will measure ourselves by four values that are intended to capture the spirit of how we work. We aspire to be:

Innovative – We will seek out ways to do things better, be that designing fusion systems or how we operate our organisation.

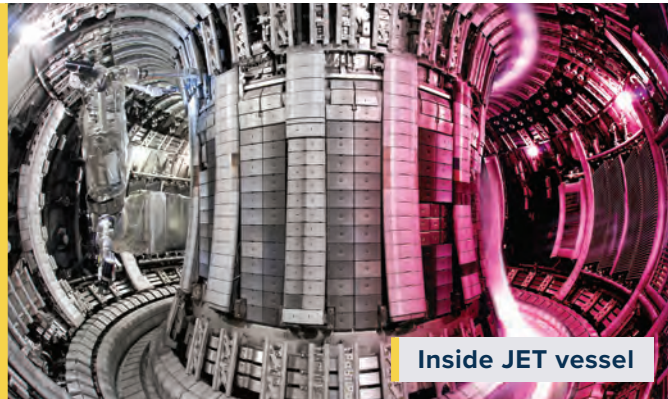
Committed – We believe wholeheartedly in the importance and value of our mission and will do what we can to achieve it.

Trusted – We strive to be open, transparent and inclusive, so that everyone we work with believes and values what we say and do.

Collaborative – We believe in the power and importance of working in partnership and will strive to be highly collaborative in our partnerships.

OUR EXPERIMENTS AND FACILITIES

JET



Inside JET vessel

Effective confinement 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 on behalf of the European Commission 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.

MAST Upgrade



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 the world's largest operational "spherical" tokamak. 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.

MRF



MRF facility

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.

RACE



Telescopic Articulated Remote Manipulator in 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.

H3AT



Interim H3AT facility

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 2022. 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.

Fusion Technology



HIVE testing facility

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 at Culham and in Rotherham will include an evolving range of bespoke capabilities to design and test metre-scale fusion power plant components, supporting fusion power plant design programmes and setting the standard for component testing in fusion.

OUR MAJOR PROGRAMMES

Fusion Research



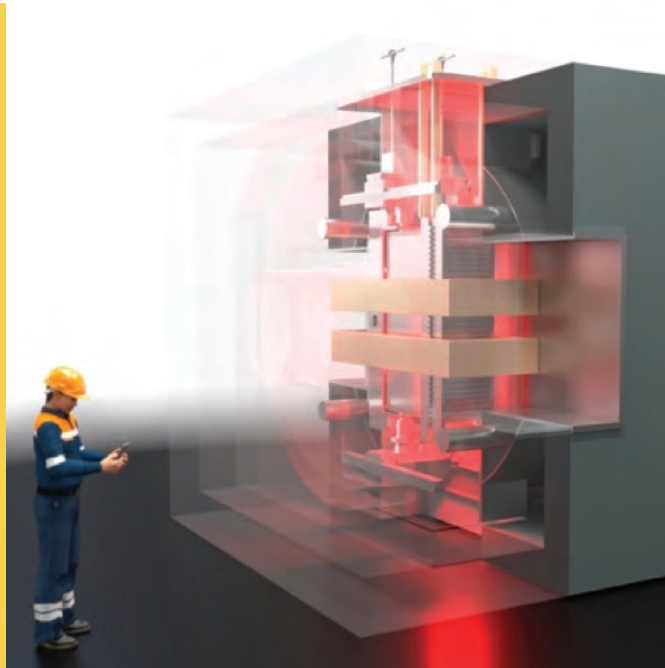
The Fusion research programme, UKAEA's underpinning research and innovation programme funded by UKRI, EUROfusion and other sources, focusses on fundamental science and technological development to advance fusion. The programme addresses fundamental fusion research challenges in six key areas where deep innovation is required to match the challenge of fusion development: Tokamak science and plasma physics, materials science, tritium science, fusion technology, remote maintenance, and advanced computing. Through the UK Fusion programme, UKAEA researchers contribute and lead in the development of the global fusion knowledge base, helping to find the solutions that will make fusion a reality.

STEP



STEP is an ambitious programme to deliver a UK prototype fusion energy plant, targeting 2040, and a path to commercial viability of fusion. The programme builds on the UK's fusion leadership and engages both industry and academia across the nation. The initial five-year tranche-1 of the programme, funded by the UK Government and managed by UKAEA, aims to produce a viable concept design, a delivery proposal for subsequent tranches and will select a host site, alongside a host of benefits arising as the programme progresses. 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 plant. The programme has completed year 2 of the five year tranche-1 focused on development of the STEP concept design.

NFTP



In 2017 the UK Government announced the £86m National Fusion Technology Platform investment as part of the Industrial Strategy Challenge Fund to establish two new capabilities at UKAEA – the Fusion Technology (FT) facilities in Rotherham and the Hydrogen-3 Advanced Technologies (H3AT) facility at Culham. These new facilities, in combination with the existing RACE and MRF capabilities greatly expand UKAEA’s ability to support industry in winning ITER contracts. As part of NFTP, UKAEA has established its first regional presence outside Oxfordshire in a decade in our new Yorkshire facility, on the Advanced Manufacturing Park in Rotherham.

Fusion Foundations



Fusion Foundations is a wide-ranging five-year programme to deliver facilities, infrastructure and skills to enable world leading fusion and innovation in the UK. Now moving into its second year, the programme will revitalise the Culham campus with investment in modernised office space, a new entrance and commercial buildings. The Programme also includes enhanced capabilities in UKAEA’s facilities with new equipment and capacity, a full IT transformation project, and expanded apprenticeship skills in new sectors and locations. The programme also seeks to nucleate a UK fusion cluster around the infrastructure and capabilities provided by UKAEA to stimulate and support research and innovation in the private fusion sector.

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

Performance

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.



Supporting National and International Science

Contributing to and leading teams in domestic and international collaborations in fusion science and engineering and adjacent fields.



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.



Campus Development and Site Management

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

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. Our research is conducted in line with UKRI guidelines and open data policies.


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.


What we did in 2020/21


- ▶ Produced globally impactful results in a number of key areas, including plasma physics, materials science, tritium, and robotics 
- ▶ Major presentations at international conferences including the prestigious IAEA fusion energy conference

- ▶ Two successful experimental campaigns completed on JET with third ongoing 
- ▶ Commissioned MAST Upgrade and began its first ever experimental campaign

- ▶ Contributed to and led international scientific teams in EUROfusion 
- ▶ Collaborated with and supported universities across the UK, including PhD supervision

- ▶ Completed handover of the new Rotherham facility 
- ▶ Obtained clearance to run MRF at full radioactive limit

- ▶ 273 new starters 
- ▶ 96 apprentices within workforce
- ▶ 78 graduates within the workforce
- ▶ PhDs supported from over 20 universities nationally

- ▶ Major extension to RACE complete 
- ▶ Extension to MRF underway
- ▶ Planning applications submitted for three major new buildings including expansion to OAS
- ▶ Tenant space remained >90% occupied

Funding	Expertise	Partnerships
<p>Our major sources of funding are from the UK Government, through our sponsor department BEIS and the Engineering and Physical Sciences Research Council fusion grant, and from the European Commission through a bilateral operating contract for JET.</p>	<p>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.</p>	<p>We cannot deliver fusion energy in isolation, and engagement with external partners in industry and academia, both domestic and international, is key to our delivery.</p>

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.

Performance



For illustration purposes only, see Stakeholder section for further information.

Our Chief Executive Officer (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. With the establishment of two major programmes STEP & Fusion Foundations, this external assurance has been extended and now includes programme & project reviews by the Infrastructure and Projects Authority (IPA).

PERFORMANCE REPORT

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 and the Audit & Risk Assurance Committee with onward reporting to the Board via the Chief Executives report. Additional reports may be submitted by exception as advised by the Head of Assurance or requested by the Executive Committee or Board.

A bi-annual risk and audit mapping report is also submitted to the Audit & Risk Assurance 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.

For some time UKAEA has operated a mature Enterprise Risk Management process with significant risks and associated mitigations tracked, challenged and moderated by

Programme/Project Boards and the Risk Review Group, with active engagement by senior management through Executive, ARAC and Board.

UKAEA’s growth in scale, complexity and ambition over recent years has increased the need for a more sophisticated approach to risk management particularly within major new Programmes like STEP. To meet this challenge, we are now in the process introducing a new Risk Management Software Platform (ARM - Active Risk Manager) enabling further improvement in our understanding of the cost of risk, effectiveness of mitigations and business resilience as well as improving the interconnections between risk, dashboard reporting and risk assurance capability within UKAEA. Migration of existing risks to ARM is on track for completion before the end of October 2021 after which ongoing support will be provided to risk owners to help them enhance the quality of risk information, embed risk management within business activities and fully realise the value of a centralised, industry standard approach. This new approach will provide strong foundations for managing the risks we will face as we strive to achieve our mission and corporate goals.

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.



OUR RISK MANAGEMENT

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 co-ordinate deployment of the risk management arrangements, ensure consistency of approach, and periodically report risk to the Executive Committee, Audit & Risk Assurance 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 Audit & Risk Assurance Committee on behalf of the Board formally reviews key risks on an ongoing basis in conjunction with UKAEA's risk appetite statement, reporting and / or escalating to the Board as required.

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 came a number of challenges as the UK transitioned from the EU and Euratom. The Government's committed to collaborating internationally on fusion R&D was demonstrated by the UK-EU Joint Declaration on Participation in the Union which, after being passed into law on 30th December 2020, allows for full participation of the UK in Euratom programmes as an associate member under equivalent conditions.

Throughout this year, the UK has remained under legal restrictions due to the COVID-19 pandemic. This threat has been managed as a live issue through our crisis and business resilience processes. We developed a strategy and phased plan which remained in place throughout the year and adapted our response in line with Government guidance. The scientific programme is heavily reliant on the use of the operational facilities, technical equipment and laboratories of the UKAEA sites. Thus, under our COVID-19 response our sites and facilities remained operational throughout with the sites operating under COVID-19 secure measures. This places particular emphasis on our operational environment and the need to deliver major programmes, such as JET experimental campaigns, MAST-U Enhancements, 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 significant ongoing investment in STEP, NFTP and Fusion Foundations 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.

Following the decision that the JET Facility will cease its scientific campaigns at the end of 2023, transitioning the organisation to own and enable the decommissioning of JET, the repurposing of assets to support the wider scientific programme and the regeneration of the JET part of the Culham site, represents considerable change for the organisation with the decommissioning programme

PERFORMANCE REPORT

itself presenting new risks and scientific challenge. In response, management planning has ramped up in early 2021 and will continue to increase to ensure the impact of JET’s closure and legacy on UKAEA and the UK is a positive one.

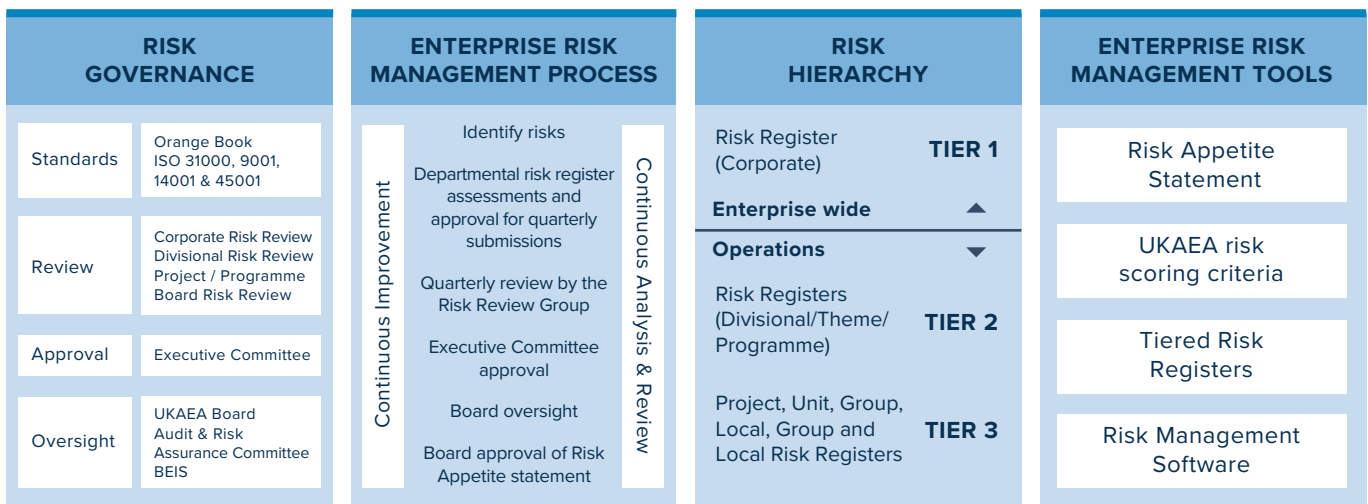
UKAEA has continued to grow consistently for a number of years. UKAEA continues to extend its portfolio of expertise and the need to recruit exceptional employees continues. Availability of skills and expertise continues to be challenging. Shortages remain in areas such as control &

instrumentation technicians, engineers (cryogenic, electrical, systems, process, mechanical, design), technical project managers, plasma physicists, procurement officers, project managers, and other specialists. These are being addressed through a variety of recruitment campaigns, including targeted social media, recruitment fairs and hard copy adverts, and in discussion with our sponsoring department BEIS. Nevertheless, recruiting and retaining skills in key shortages areas remains a key area of focus.

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 & Risk Assurance Committee, and the Board. To support the integration and calibration of risks across UKAEA, a new tool “ARM” is in process of being implemented with full roll out anticipated by the end of 2021, further enhancing the escalation and management of risks. 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. Risks are regularly reported to the Board via Audit and Risk Assurance Committee, and quarterly to UKAEA’s sponsoring department BEIS

UKAEA RISK MANAGEMENT PROCESSES



OUR RISK APPETITE

Our risk appetite and the achievement of our goals demands ambition and varies according to

HIGH SCIENTIFIC RISK

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 we would normally tolerate with an expectation of commensurate return on investment. 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. Staff are provided with operational training, mentoring and ongoing education to include hazard awareness and control. 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 & HEALTH OF PEOPLE

The health and safety of personnel be they employees, contractors, visitors or members of the public is paramount to us. We take our obligations in this area extremely seriously and expect all safety risks to be fully mitigated not only in line with all applicable legislation but also taking into account shared best practice with similar research organisations.

LOW ETHICAL

Responsible business conduct is fundamental to the success of our organisation. We expect our staff to always work to high ethical standards and therefore have very low tolerance of risk in this area.

PERFORMANCE REPORT

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
THE FOLLOWING RISKS, PRESENTED IN 2019/20, HAVE BEEN RETIRED OR MODIFIED IN 2020/21			
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.	RETIRED —
MAST-U fails to deliver first science within schedule		We raised the project profile making it our priority across the business following completion of JET KPIs, with a re-baselined project plan under strong project management principles.	MODIFIED ↓
RISKS CARRIED FORWARD IN 2020/21			
STRATEGIC			
Failure to deliver an investible concept design solution for STEP		We developed a risk reduction strategy and worked extensively to establish good working relationships with internal and external stakeholders, with a unique programme board.	↑
MAST-U Enhancements fails to deliver the capabilities promised to EUROfusion within the agreed timescales		A project board is in place monitoring tenders, timeline and budget. Investigation of optimum installation plan underway.	↔
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. We have commissioned an interim facility to enable some technical work to be completed before the main H3AT facility is available.	↑
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. Adoption of the South Oxfordshire Local Plan moves Culham Campus from the Green Belt.	↓
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.	↔
Lack of investment in existing property assets impacts on operations		We have increased our response to long-term lifecycle issues and refurbishment of space through the Fusion Foundations programme and increased funding to address maintenance issues such as roof replacements.	↓

Performance

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, UKRI, and Ministers. We have also built key relationships with other Government departments to ensure Government and Parliament remain informed and up to date.

OUR PARTNERS

Strong partnerships with international institutions and programmes including the EUROfusion consortium and others, domestic agencies, professional bodies, private businesses, trade associations and the industrial supply chain, help us to advance our mission.

OUR PEOPLE

We engage our staff through a variety of channels to ensure that they have a shared view of our strategy, and a voice to be heard at the highest levels.

THE UK PUBLIC

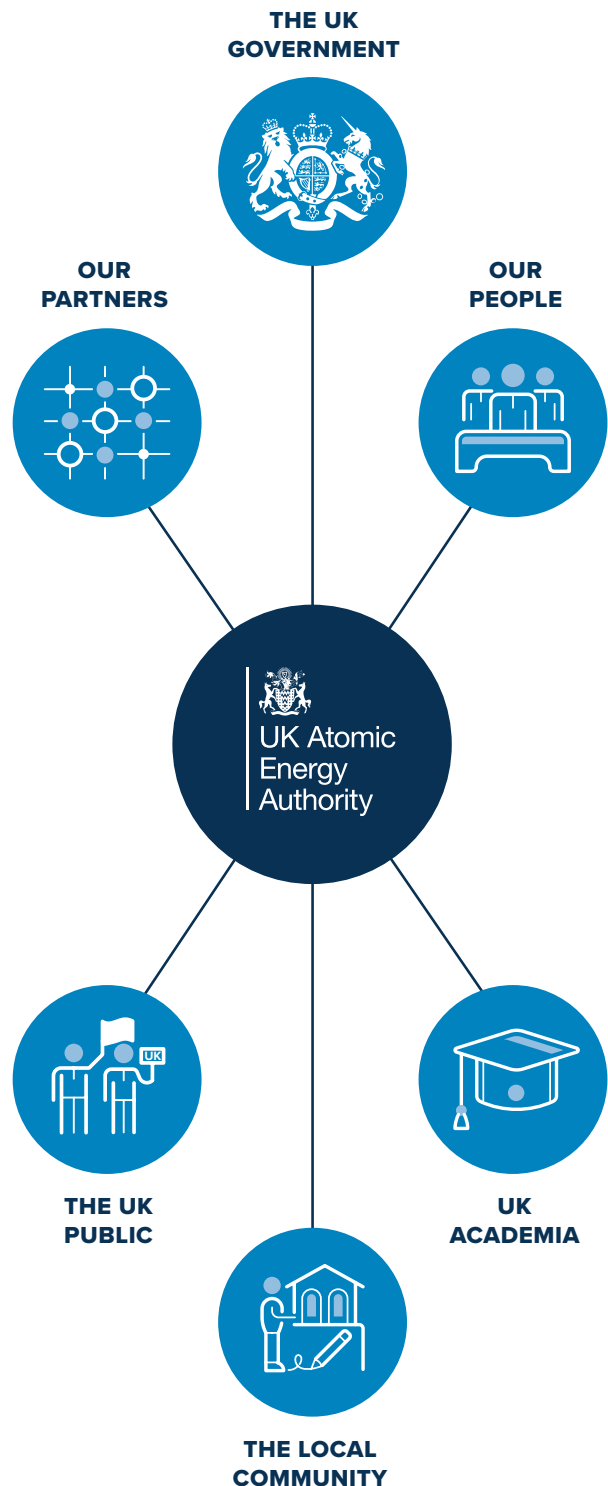
As a responsible holder of public funds, we have a duty to engage the wider UK public our exciting work. We hold regular events, to public, school, university and other audiences which have been virtual this year and maximise our media and social media coverage to inform, excite and enthuse anyone interested 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 a workforce of over 2000 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.



UKAEA'S RESPONSE TO COVID-19

Management of the COVID-19 risk has required significant commitment of resource and time to ensure the site was and remained COVID-19 secure. We quickly implemented our COVID-19 strategy and plan, underpinned by a strong leadership commitment to keeping our people safe and to following Government guidance. Our key operational workforce including those supporting the national effort remained on-site. Our operational tokamaks and operational systems were placed into their passive and safe state – completed as soon as possible after the 23rd March 2020 and achieved by 30th March. Through a phased plan, a rapid return to full operational capability was managed to facilitate the delivery of our operational performance targets with our critical workforce. A robust set of controls, in a lines of defence model, were implemented, including:

- A senior authority to come to work
- separating the Culham site into zones with each zone subject to Area Management Plans and controlled by Directors
- Appointed Wardens for implementing controls inside and outside of buildings in line with Government Workforce guidance
- An outbreak strategy and COVID-19 symptom and confirmed cases on and off-site test and tracing
- Investigation of site control breaches.

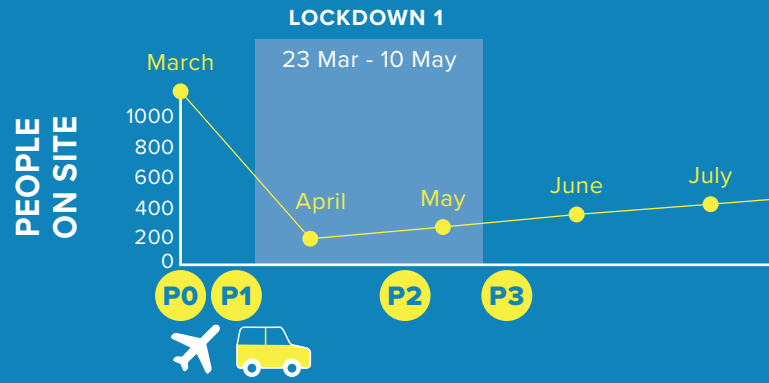
We implemented policies on supporting our workforce to work at home, encouraging flexibility in working to deal with caring issues and responsibilities and non-productive time, on travel and leave, and to support mental health and well-being. Our plan for a reduction in our controls to allow full site return for all our workforce is ready and will result in different ways of working. We plan to retain elements of our control to protect our operation and maintain readiness for future crises.

We supported our staff during the COVID-19 pandemic with the CEO providing monthly staff talks, the broadcasting of weekly well-being communications, and regular management briefings. The COO wrote regularly throughout, offering the latest COVID-19 planning and management thinking. This was supplemented with a regularly updated and highly visible intranet page as a single point of information for our workforce. We have sought staff feedback in a number of pulse surveys and have consistently found that around 94% understood our COVID-19 policies, 93% felt supported by UKAEA, and 84% felt that the frequency of our comms was right.

Our Trade Union are Prospect and we have an extant framework on how we engage and consult. We have involved our Trade Union on our COVID-19 response throughout and use our current mechanisms to seek their feedback and thinking on current issues.

Whilst COVID-19 had an unavoidable impact on UKAEA's performance the adaptability and resilience of the workforce under a robust safety culture with steadfast leadership ensured that risks were mitigated, and performance was maintained as much as possible. As restrictions lift, many risks are reducing. In the table to follow we indicate the status of risks identified at the outset of the pandemic, their status now, and risks that have been identified since.

IMPACT OF COVID-19



17th March 2020
UK Business travel ceased, and non-operational departments begin transition to working at home

UKAEA CONTROL MEASURES

KEY RISKS

Pre-pandemic

Jan 2020
Situation monitoring, and preparation begins

P0 Phase 0

1st March 2020
Crisis management procedures begin; non-essential business travel overseas ceased

P1 Phase 1

23rd March 2020
Remote working for non-key workers. Operational shutdown with tokamaks and operational equipment in safe and passive state

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RELATES TO ALL

KEY RISKS FROM COVID-19 FROM 2019/20 – NOW RETIRED

STRATEGIC PRIORITY

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.

Reduced working efficiency, due to the move to remote working, impacts short term delivery.

FROM 2019/20 – ONGOING

Continuing impact of COVID-19 causes milestone slippage, loss of fusion progress and funding.

Failure to embed new ways of working and take our people with us on the journey impacts long term delivery.

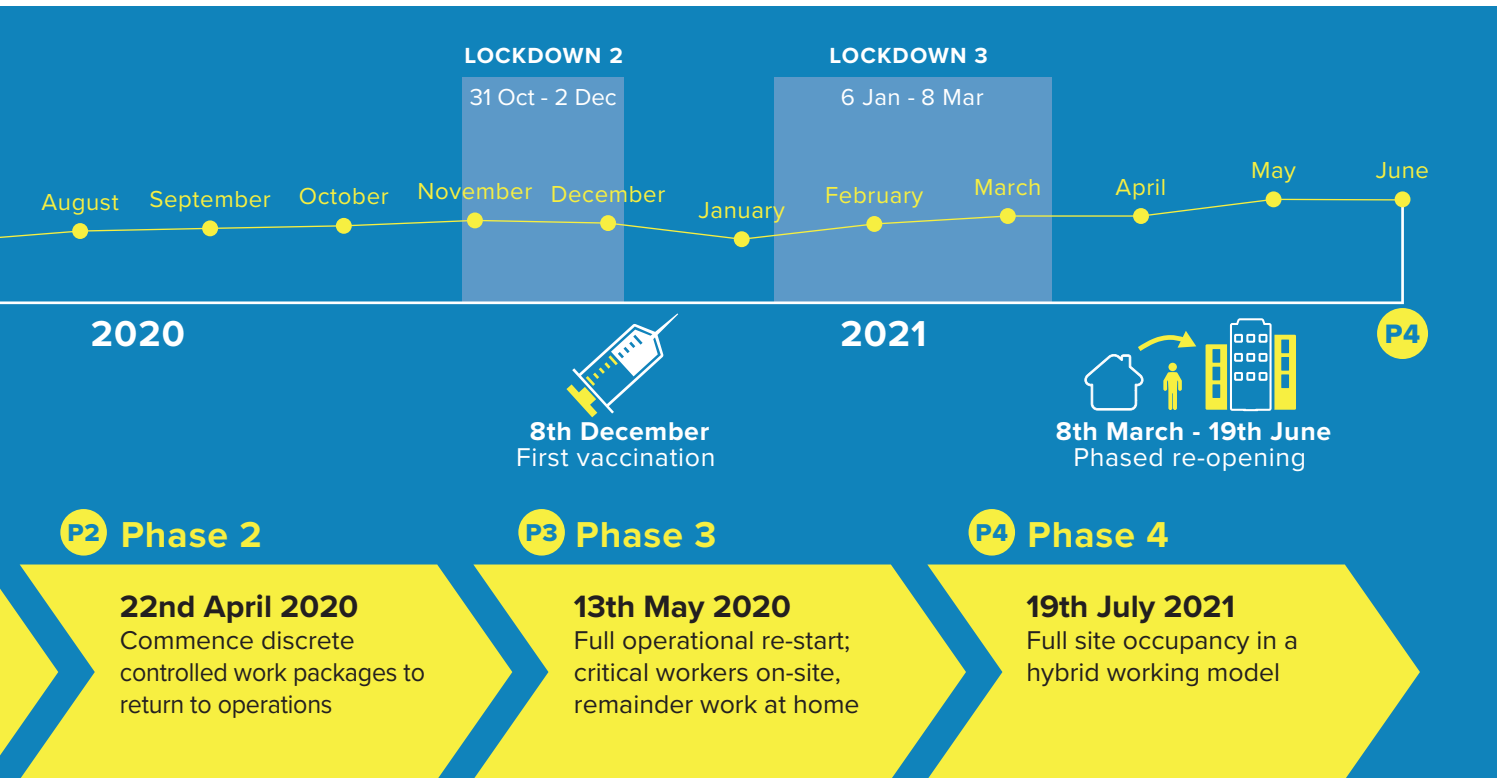
COVID-19 damages development of UK fusion supply chain.

NEW IN 2020/21

Increased working from home may heighten the risk of cyber attacks.

Post COVID-19 employment conditions and pay restraint causes a loss of morale and engagement.

COVID-19 aftermath causes an escalation in operational and supply chain costs.



COVID-19 RELATED EXPENDITURE

The major impact of COVID-19 from a financial perspective was the unproductive staff costs, where individuals were unable to work productively in operational roles on site due to COVID-19 restrictions. This included technical agency workers, who were offered a retention scheme (in line with Government Furlough guidance), in order to support them through the pandemic and assure critical skills were available to recommence operations as soon as we were able to. The overall impact of lost time / retention was £3.3m which was met through existing budgets.

National Effort work, including project relating to ventilators and face shields was expensed at £0.2m.

A further £1.1m of operational costs in respect to mobilisation of remote working, impact on site operational infrastructure such as the canteen, cleaning and deploying COVID-19 secure working environments.

The Fusion Foundation programme commenced as the pandemic began. This already included funding to upgrade critical IT infrastructure, equipment and capability. Thereby resolving various technical challenges the guidance to work from home brought, including refresh of laptops and audio visual meeting facilities.

CONTRIBUTIONS TO THE NATIONAL EFFORT

Skills – We have a wide and varied set of skills amongst our staff which we made available to the National Effort including in project management and communications within central Government.

Supply Chain – Our Special Techniques Group were designated as Key Workers to continue production of components for the supply chain to the NHS. Over 2500 assemblies have been manufactured for MRI scanners since 12th April 2020.

Manufacturing – We co-ordinated manufacturing capabilities for ventilator components through the Crown Commercial Services and High Value Manufacturing Catapult.

Supporting local services – We have worked with local industry to provide a laser cutting service to aid with production of face shields for local NHS and care workers. UKAEA manufactured face shield components using in-house 3D printing capability. We assembled and delivered >2,000 to local NHS hospitals and care facilities.

PPE – We donated large volumes of facemasks and gloves to local hospitals. During the first wave urgent supplies were provided to Charing Cross Hospital to enable continued surgical airway interventions.

Supporting R&D – UKAEA manufactured test samples of a new design of adaptor as part of a ventilator project for Imperial College Healthcare NHS Trust. We led the research software engineering effort for the Scottish COVID-19 Response Consortium to develop long range forecasting models which are informing government policy.

EU EXIT

The UK's transition from the European Union impacted UKAEA, as with many other organisations, in several ways including changes in business areas such as procurement and recruitment. The most significant factor affecting UKAEA in the transition from the EU has been the UK's association to Euratom. Whilst membership of the EU and Euratom are separate, Euratom membership has been of the EU member states and is governed in large part by the European Commission. The UK Government judged it legally necessary to leave Euratom at the same time as the EU. On 30th December 2020, the UK Government passed the UK-EU Joint Declaration on Participation in the Union into law, which allows for full participation of the UK in Euratom programmes as an associate member under equivalent conditions.

The impact of Euratom association is present in the UKAEA and wider UK fusion programme primarily in three key areas:

Performance

JET	ITER	EUROfusion
JET is operated by UKAEA under a bilateral contract with the European Commission. In 2020, all parties agreed to an extension of this contract until October 2021, after which under the terms of association the device will be operated as a UK asset under a co-fund arrangement with the EUROfusion consortium. The scientific programme determined by EUROfusion. This maintains the vital scientific output of JET, the only machine capable of performing high-power fusion experiments, in the years before ITER comes online with a diverse international scientific team and a uniquely experienced operating team within UKAEA.	UK industry has secured £650m of contracts from ITER, and with UKAEA support through unique expertise and capabilities, we target another £1bn before operations begin in 2025. Access to these contracts is only available to F4E members (F4E is the EU's procurement agency for ITER contributions). When operational ITER will be a focal point for fusion science.	Through the Euratom Research and Training (R&T) programme, UKAEA is a member of the EUROfusion consortium and gains access, free at the point of use, to dozens of world class facilities, expertise and training. MAST Upgrade will operate as a EUROfusion device with a portion of the MAST-U experimental programme allocated for EUROfusion experiments.

IMPACT ON PERFORMANCE

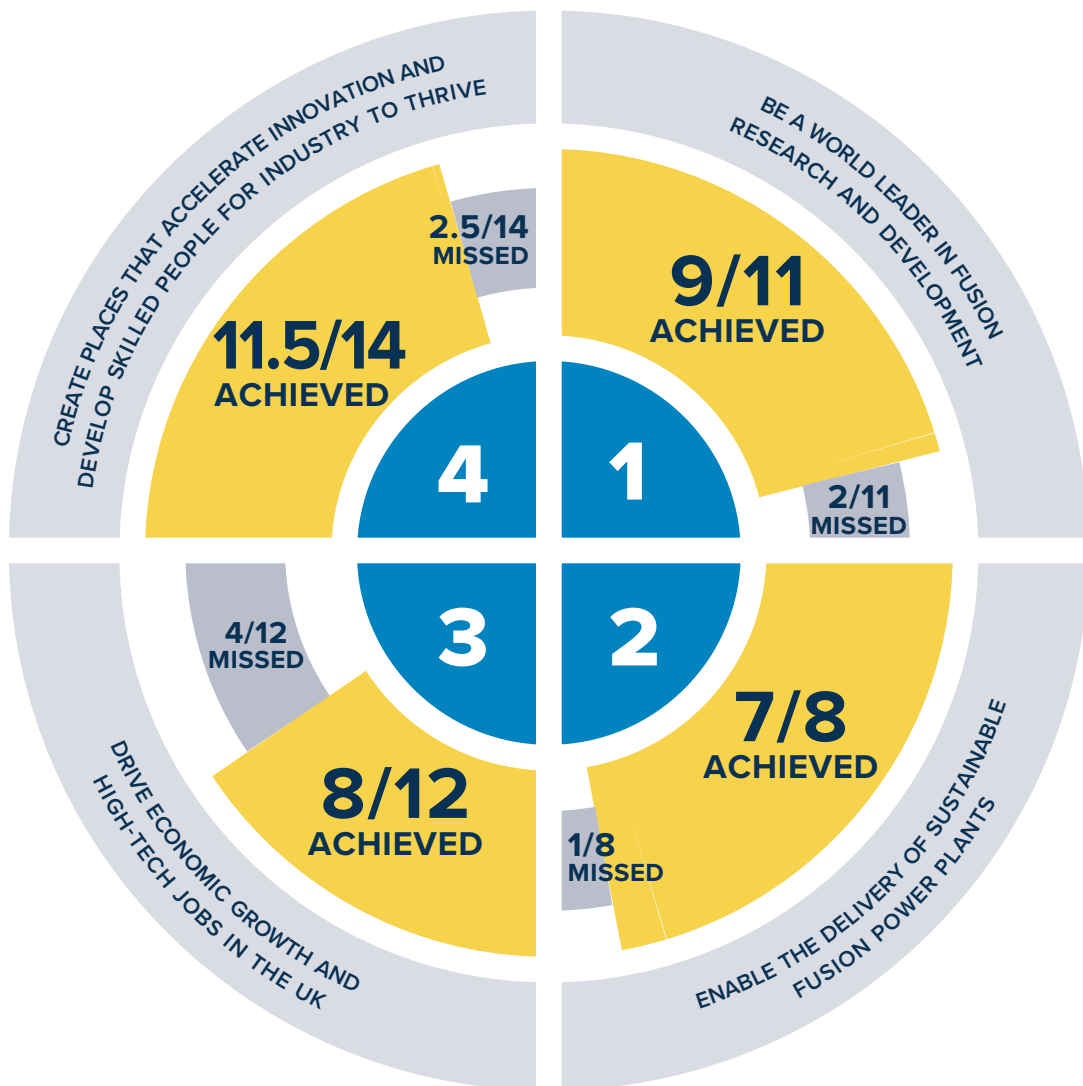
As the UK's future role in the EU was under negotiation, significant unavoidable uncertainty was felt across the organisation. The resilience of UKAEA's people, major investment of management time and regular communication of key issues mitigated much of the potential impact on performance. In this period of uncertainty, UKAEA achieved many globally significant results including new records set on JET and world-first results on MAST Upgrade achieved this year.

PERFORMANCE OVERVIEW

The performance overview and analysis present an overview of UKAEA's performance in the period 2020/21, providing an indication of performance measures achieved or missed, and a detailed description of programme performance against UKAEA's strategic goals.

Performance Overview - Milestones

In 2020/21 we undertook a review of our performance measures. To improve the strategic direction and traceability of performance, we reduced from 151 milestones in 2019/20 to 45 this year targeted in ambitious, important and impactful areas that support UKAEA's mission and goals. In total we achieved 79% of our milestones in 2020/21, which is broken down by objective below:



A detailed analysis of our performance in 2020/2021 is provided in the performance analysis section that follows.

OBJECTIVE 1:

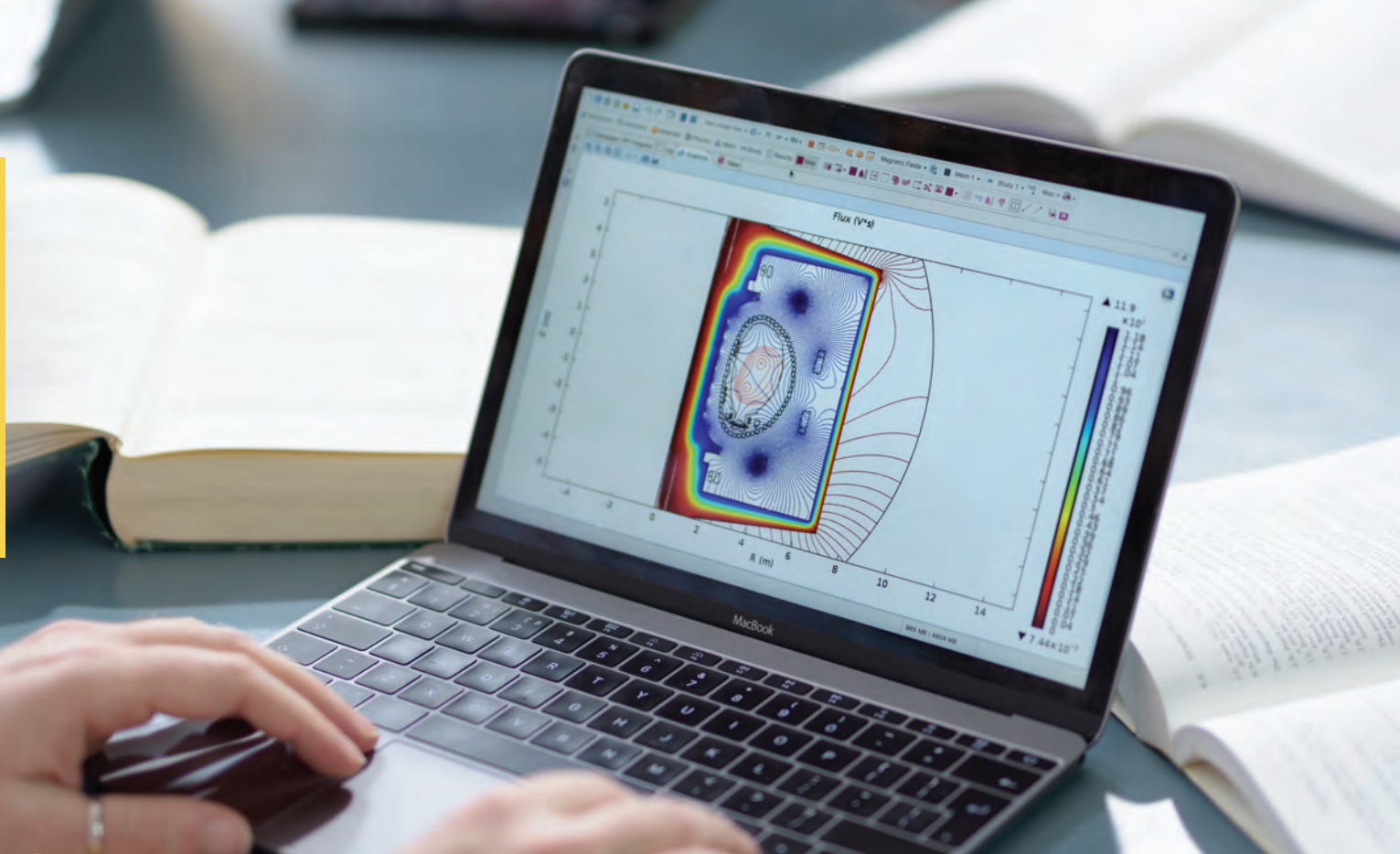
BE A WORLD LEADER IN FUSION RESEARCH AND DEVELOPMENT

Milestones

9/11
ACHIEVED

2/11
MISSED

Performance



Fusion research and development sits at the core of UKAEA's identity. Maintaining a strong world-renowned research programme is essential to realising UKAEA's mission by developing new ideas and technology to drive fusion forwards. In operating and being a leading contributor to the scientific output of the EU's JET facility at Culham – widely acknowledged as the most capable fusion research facility in the world – and participating in the science of ITER as a route to a key experimental validation of fusion energy gain, UKAEA research will remain at the forefront of the global community. UKAEA's MAST Upgrade device at Culham represents a unique experimental facility advancing fusion towards higher performance and more compact design and providing key experimental input to the modelling and understanding of fusion systems. Our RACE, MRF and future facilities offer a unique breadth of experimental capability in robotics, materials, component design and manufacture, and tritium to address fundamental challenges in fusion science and technology. As a primary use case for these experimental capabilities, the UK Fusion programme focusses on developing the fundamental science underpinning fusion power plant design and innovating to improve performance and reduce costs for future sustainable fusion power production.

FUSION RESEARCH AND DEVELOPMENT

6/7 MILESTONES ACHIEVED

The UK fusion programme focusses on fundamental research and development to drive fusion forwards, convening the UK fusion community, and training the next generation of fusion scientists and engineers. The programme is conducted under grants, majority funded by the Engineering and Physical Sciences Research Council, and the current programme comes to an end in March 2022 such that a major focus this year has been the preparation of a proposal for a new, vibrant, ambitious, and multi-disciplinary grant proposal that builds on the foundations of the current one. The UK fusion programme focusses on six key areas of R&D:

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. On 27th October 2020, MAST Upgrade ran its first plasma – the first successful run of the machine with all systems in place and a major milestone for the device. Representing the culmination of seven years of hard work on a world-first engineering challenge including installation of 130,000 new components, 120km of cables, 2km of gas supply lines, 19 magnetic field and a new central solenoid. At the outbreak of the COVID-19 pandemic, all operations other than those deemed safety critical were suspended for 3 months. Whilst the team were quick to adapt to new and challenging ways of working in a COVID-19 secure environment, the delay increased pressure to meet KPIs required by EUROfusion. In September 2020, following the completion of key JET milestones (see page 34) MAST Upgrade was designated the organisation's top priority, and in February 2021 these KPIs were achieved to the revised schedule agreed with EUROfusion. In doing so, the team successfully achieved full power heating of the MAST Upgrade plasma and, through the innovative Super-X divertor, achieved a major milestone by demonstrating that the excess heat from the plasma to material surfaces was reduced by approximately 20 times – the first time such a configuration has been tested, which provides a potential solution to a long standing challenge of fusion. As with any first of a kind facility, progress has at times been halting as unforeseen issues arise and

new ways of working during the COVID-19 pandemic challenge normal processes. Our preparations to enhance MAST Upgrade in coming years have been challenged through resource pressure, and difficulties finding suppliers for key components which resulted in the missing of a milestone to place all key procurements for enhanced heating systems in the year. Despite these challenges, on 26th May 2021



In Focus: The Super-X divertor

How do you keep the hot fusion plasma burning at $>100,000,000\text{K}$ whilst keeping the materials and structures of the machine cold? The answer, much like a car engine, is to create an exhaust channel – called a divertor – where the hot plasma can cool before it hits materials. Unfortunately, standard divertors may not be up to the challenge, creating a problem for fusion power plant designs. The new and unique Super-X divertor on MAST Upgrade provides a possible answer by extending this cooling channel with clever magnetic field arrangements and new chambers in the machine. In 2021 the first results were announced which showed more than 10 times reduction in the amount of heat hitting material surfaces using the Super-X divertor – a world-first result that may provide much needed solutions for fusion power plants.

PERFORMANCE REPORT

astronaut Tim Peake officially opened the facility for its first experimental campaign, a testament to the determination of the MAST Upgrade team and setting up 2021/22 as an exciting year for MAST Upgrade.

TOKAMAK SCIENCE

The Tokamak Science programme 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. A major focus for our scientists in 2020/21 was leading experiments in JET to prepare for the ambitious, high-power deuterium-tritium fusion campaign in late 2021. Working with pure deuterium plasmas, UKAEA scientists leading international pan-European teams developed parallel scenarios thought to achieve the highest performance in preparation for fusion experiments. In doing so the team broke a number of long standing records, including the highest rate and total number of neutrons (born out of fusion reactions) ever produced in deuterium plasmas. These scenarios have been repeated in hydrogen (to increase scientific understanding) and are now being tested in pure tritium plasmas to pave the way for the fusion campaigns to come. Further afield our scientists continued to contribute to international experiments, in Germany, Switzerland and elsewhere, albeit remotely as the pandemic's effects were felt throughout the community. Theory and modelling remain a strong backbone to the scientific programme, and 2020/21 saw developments in a number of areas. A major milestone was met, motivated by a major emerging theme to embed deep understanding of uncertainty to improve our confidence in modelling of fusion plasmas, whilst detailed modelling of the cold exhaust region of ITER has helped to understand the limits of predictability there. The excellence of the UKAEA tokamak science programme was on show at the prestigious IAEA fusion energy conference in May 2021, with 16 contributions to a large and international audience of peers virtually.

ADVANCED COMPUTING

Fusion research is 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 digital capability of fusion forwards. We are a partner in the design and development of the ExCALIBUR project, a major new EPSRC programme led by the Met Office to develop simulation tools in the UK to exploit the radically changing exascale supercomputing architectures of the future. We continue to engage with a range of partners, including Nvidia, Intel, Universities including Oxford, Cambridge, and Manchester, to explore applications of cutting edge digital technologies and architectures to the challenges of fusion.

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 2020/21 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. This year the materials modelling team took pioneering steps towards a simulator capable of predicting material damage under fusion powerplant environmental conditions by agreeing the mathematical approaches needed and producing complex calculations of radiation induced damage in all significant elemental metals in the periodic table. Work continued on the use of nuclear data for fusion materials, with major developments taken towards the 5th release of the FISPACT-II library – an advanced inventory code with a worldwide user base. In 2021, a new team was formed to focus on experimental materials science and engineering. Already engaged with a number of academic and industrial partners, this team will focus on assessing the suitability of new materials, and enhancement of existing materials for fusion, including high temperature steels, ceramics, and resilient coatings for corrosive and/or tritium rich environments.

FUSION TECHNOLOGY

Developing, designing and fabricating the technology needed for a fusion power plant is a challenge given its exacting environment. High energy neutrons, high magnetic fields, strong temperature gradients and a range of other factors

PERFORMANCE REPORT

create a need for innovative design, manufacture, and testing processes to deliver the technological and structural components of a fusion reactor. This year the team took new steps forward with a technique called Digital Image Correlation – using cameras and advanced material preparation techniques to measure stress without damaging samples – and a new experimental rig is in development in our Rotherham facility. Building on world leading expertise in fusion systems modelling, a new, more efficient and flexible whole-device design code that exploits new computing techniques has been developed which will support STEP and DEMO design work. Throughout the year the team have played key roles supporting fusion powerplant designs in STEP and EUROfusion DEMO, making many design contributions in both programmes. The team submitted two new patents this year, highlighting the innovative output from the group, and provided a plenary talk at the prestigious Symposium on Fusion Technology.

In 2021 two new groups have been formed within Fusion Technology. The MTEQ (Manufacturing Technology and Equipment Qualification) group was formed to focus on both advanced manufacturing processes and the qualification of manufacturing techniques and components for use in fusion. The MTEQ group is based across Culham and Rotherham sites, where the team are located on the Advanced Manufacturing Park alongside a number of technology leaders in this field. A Thermal Hydraulics group has also been formed to address the unique challenges of highly pressurised and heated liquids in a fusion environment, supported by a number of advanced test rigs including the exciting new CHIMERA facility.

TRITIUM SCIENCE

Tritium is the radioactive isotope of hydrogen used to fuel the fusion reaction alongside the non-radioactive isotope deuterium (extractable from natural water). Being lighter than other elements, hydrogen isotopes are able to permeate materials easily. These factors mean that designing tritium systems for fusion is challenging and requires dedicated research and innovation. A focus for the team in the year has been the exploration of deuterium (a lighter, non-radioactive hydrogen isotope commonly found in water) and tritium interaction with materials using an innovative unique implantation experimental device at UKAEA, led by our scientists within a team

of national and international collaborators. New experiments are being designed and commissioned to investigate isotope separation, tritium analytics, and analysis of exposed materials from JET. The growth in our experimental capabilities reflects the importance and excitement in this area as the new H3AT facility.

ROBOTICS

A fusion power plant in or after operation will be a hostile environment for human operators, and alternative solutions to maintenance, servicing, inspection and decommissioning will be necessary. Primarily focused on the EUROfusion DEMO programme (see page 38), the work undertaken to date in Robotics within the UK fusion programme has led to the widespread acceptance that remote maintenance is device defining and mission critical: a fusion power plant has to be designed to be remotely operated and the remote maintenance system must work. Alongside systems engineering and design of maintenance solutions and strategies for DEMO, several large scale test systems have been developed and studied within RACE. These include TARM – the Telescopic Articulated Remote Manipulator, built for JET in the 1990s and now refurbished to test new control systems allowing for high payload movement at acceptable speed – and AIM-TU – The Automated Inspection and Maintenance Test Unit to test automation of maintenance tasks using digital twin technology with the power to adapt to unknown environments.

OUTREACH AND TRAINING

UKAEA benefits from many strong collaborations with universities, both domestically and internationally, and supports a wide range of undergraduate, masters, and doctoral students with projects using UKAEA facilities, expertise, and supervision. Despite the challenges of the pandemic our public engagement and outreach remains strong, and the move to virtual events presented exciting new opportunities for engagement. In total we hosted 65 live virtual events including online talks, lectures, interviews, drop-ins, and virtual tours, reaching 5500 individuals. Our outreach in media increased this year, with nearly 800 pieces of media coverage in 46 countries, and over 95,000 engagements with UKAEA social media.

JET OPERATIONS

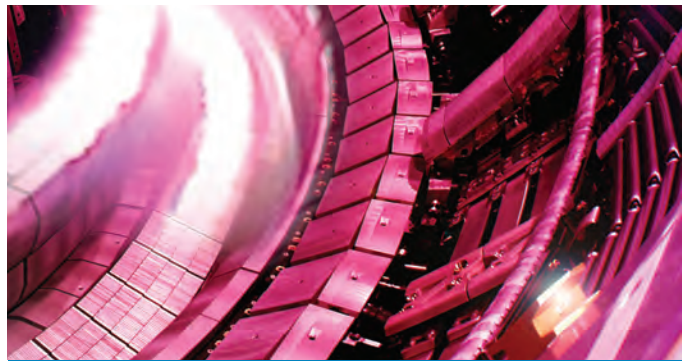
3/4 MILESTONES ACHIEVED

JET is the world's largest and most powerful operational fusion device, hosted and operated by the UKAEA at our Culham site on behalf of the European Commission via the JET Operating Contract (JOC). A large on-site team of scientists, engineers and support staff operate JET. The scientific exploitation of JET is managed by EUROfusion with JET typically receiving up to 350 visiting scientists from around Europe to participate in important and exciting experiments. This year travel restrictions prohibited all but essential scientific visits but, with provisions for virtual visits and scientific coordination rapidly rolled out at the start of the year, JET successfully completed two international experimental campaigns and completed key preparations for two more in 2021.

The first five months of the year proceeded with the JOC under suspension following UKAEA's failure to meet the "Readiness for the Tritium Campaign" milestone within the contract on 31st December 2019. This required the UK to meet all operational costs during this period under the contract's Guarantee clause. This milestone was subsequently met in September 2020 at which point the suspension was lifted and the JOC was amended with a new end date of 31st October 2021. In addition, in April 2021, the EUROfusion General Assembly endorsed an extension of JET to 31st December 2023, subject to sufficient funding being made available in their next framework Grant.

PREPARATION FOR HIGH POWER FUSION CAMPAIGNS

The scientific focus of JET in 2020/21 has largely been preparation for the high power tritium and deuterium-tritium (D-T) fusion campaigns upcoming in 2021 (as well as some additional highly valuable ITER-relevant studies that can only be performed on JET). On 23rd March JET operations ceased and JET was placed in a safe dormant state as part of UKAEA's COVID-19 response. At the time JET was mid-way through an experimental campaign – the C38 campaign – showing promising progress. On 17th June, the machine was restarted and, less than three weeks later, the C38 experimental campaign was resumed. This campaign focused on preparing scenarios for the high power tritium



In Focus: JET neutron rates

Tritium is expensive and complex to conduct experiments with, so to prepare for D-T fusion campaigns scientists design operational scenarios using the readily available deuterium (D) fuel as a proxy. This fuel produces neutrons from fusion reactions, albeit in greatly reduced numbers and energies compared to D-T, and these are used to judge the potential fusion performance of the operational scenario if D-T were to be used rather than D-D. In 2020/21, JET broke a number of important and long standing world records for D-D neutrons, including the highest neutron rate (neutrons per second) at $5.9 \times 10^{16} \text{n/s}$, the highest neutron rate sustained for longer than 5 seconds at $3.3 \times 10^{16} \text{n/s}$, and the most neutrons produced in a single experiment. Despite these successes, JET was unable to achieve its extremely ambitious target of $5 \times 10^{16} \text{n/s}$ held for 5 seconds, averaged over the 20 best pulses. Whilst there may be room to get closer to this target, the impressive progress made under trying circumstances provided enough confidence for the European Commission and EUROfusion to approve JET to move forwards in preparations for the 2021 D-T fusion campaign.

PERFORMANCE REPORT

and D-T fusion campaigns to come in 2021, by first optimising the performance of deuterium only (D-D) experiments. Although returning to a reasonably steady operational state, technical issues in some areas related to the shutdown and restart of electrical systems meant that the high reliability of the machine in early 2020 could not be repeated. Nevertheless, the scientific achievements of the campaign were significant with record breaking neutron rates (produced through D-D fusion) recorded and final KPIs met to allow the programme to progress forwards in preparations. This included a two-week rehearsal of safety and operational procedures for the upcoming D-T campaign, which was completed successfully.

Following a brief break in operations, the second experimental campaign in the year, C39, was kicked off to focus on different fuel types – hydrogen and tritium. On 7th December the first tritium plasma in 17 years was run in JET as scientists sought to understand differences in behaviour when tritium (rather than deuterium) is used. JET is the only machine in the world capable of performing these experiments. Initially performed without external heating, the follow-up experimental campaign, C40, was planned for early 2021 to introduce heating into the tritium plasmas. A series of unforeseen and unpredictable technical faults have delayed the start of this campaign, though through swift response of the operational teams the impact of these delays has been minimised – a reminder of the skill and expertise required to maintain the now 40 year old JET device. In parallel, work has been ongoing to complete the design of new features, enhancements, and refurbishments to JET to prepare it for an extension to 2023, again focussing on areas crucial to ITER.

TRITIUM SYSTEMS

JET is unique in the world through its ability to handle and run tritium experiments. Underlying this capability are a host of sub-systems required for the safe containment, movement, and accountancy of tritium, which must be handled with care due to its hazardous radioactive properties. Whilst this capability had been proven in the 1990s and early 2000s, the task to re-commission and in places fully refurbish these systems to operate JET once again with tritium – a key milestone - was major. Supplier failures and technical challenges with these complex systems stretching back to 2017 created significant pressure to deliver and resulted in the suspension of the JET Operating Contract (outlined on page 34). These were compounded by COVID-19 which affected all activities on these systems. The completion of the project to

commission these systems was designated the organisation's top priority, and with measures undertaken to allow safe working alongside major time and effort from the teams involved resulting in pre-pandemic levels of efficiency, the commissioning was completed on 4th September. This work expanded the tritium boundary to allow tritium to once again flow from active gas handling systems into JET and back – a major milestone achieved under significant working pressures. At the same time, 50g of tritium were received from Canada at the Culham site ready for experimental use. This period of operations saw rapid development up a steep learning curve under high pressure for the teams involved. Following the successful expansion of the tritium boundary, it was agreed to pause operations for 2 weeks to enable additional, off-line training to focus on the team's resilience and ability to respond effectively to off-normal conditions. Whilst this drove a programmatic delay to schedule, it illustrated the strong safety culture within UKAEA which encourages individuals at all levels to raise issues and a management commitment to respond appropriately, with personnel safety remaining the organisation's overarching priority at all times.

With tritium sub-systems now running effectively, and the team undertaking twenty-four hour shift operation, the next task was to prepare heating systems to operate in tritium. Maintaining reliability of these heating systems has been a challenge, with significant delay in achieving the targeted 30+MW of heating power in tritium (compared to 34MW previously achieved in deuterium) due to a combination of unexpected behaviours when running these systems in tritium and series of technical faults with the power supplies, coolant, and cryogenic systems. Progress towards the reliable 30+MW required by the tritium and D-T campaigns is ongoing, with the targeted 30MW of heating recently achieved.

WASTE HANDLING

Due to the COVID-19 pandemic UKAEA's radioactive waste processing facilities were put into a safe state and closed at the end of March 2020. In line with UK Government advice, waste processing staff returned to site in July 2020. After some training and recruitment, the facilities returned to full operation by late August 2020. However, the internal operational downtime resulted in a lower annual throughput of waste processing and the impact of the pandemic reduced external disposal of the waste, the teams are working hard to recover and are confident that we will achieve a zero radioactive waste liability during the next financial year.

OBJECTIVE 2:

ENABLE THE DELIVERY OF SUSTAINABLE FUSION POWER PLANTS

Milestones



Performance

UKAEA is focussing on the ‘tokamak’ approach to fusion, the most mature fusion concept in terms of development to date and an approach which can be extrapolated to envisage a full-scale fusion power plant. Building on a pioneering legacy in spherical tokamak research, UKAEA’s STEP Programme will develop commercially-viable compact fusion power plant designs, whilst the EUROfusion DEMO programme of which we are an active participant and supporter is based on the more mature but larger conventional tokamak approach. In moving from a research to a delivery phase new design approaches, processes, and tools that take an holistic view whilst respecting the complexity of a fusion power plant are in development; the legacy of these developments will be an integrated fusion design capability for fusion systems in the UK alongside wider societal benefits. Alongside technical advancements, UKAEA is committed to supporting the development of an enabling environment needed for a fusion power plant in the UK, by engaging industry and academia, providing expert advice to Government, and generating the programme tools needed to deliver the first fusion power plant.

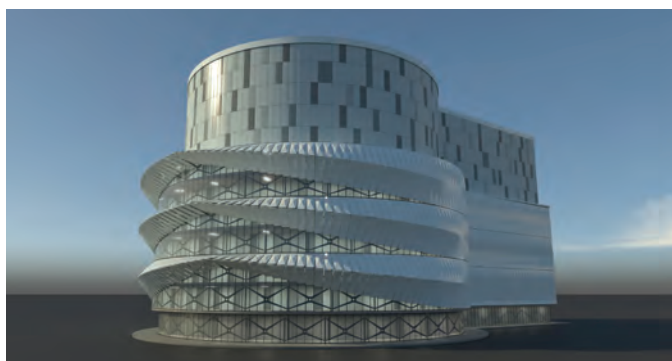
SPHERICAL TOKAMAK FOR ENERGY PRODUCTION

5/5 MILESTONES ACHIEVED

The mission of the Spherical Tokamak for Energy Production (STEP) programme is to “Deliver a UK prototype fusion energy plant, targeting 2040, and a path to commercial viability of fusion”. The programme builds on the UK’s fusion leadership and engages both industry and academia across the nation. The initial 5-year phase of the programme, funded by the UK Government and managed by UKAEA, aims to produce a viable concept design based on the innovative compact spherical tokamak design, alongside a host of benefits arising as the programme progresses, and will also generate a delivery proposal for subsequent tranches and select a site host the plant.

In 2020/21 the programme took a number of major steps towards this concept design. A new methodology for design was established that reflects the unique challenges presented by fusion energy, exploring multiple design options whilst keeping the pace needed to establish a true, first-of-a-kind integrated plant design. The programme achieved a key milestone by completing a first concept maturity review to assess the maturity of design across the required technical areas and determined that the overall maturity was commensurate with early design stage. This success allowed designs to progress into 2021, generating several design “families” from which a preferred family will be selected in the coming year for more detailed development. The development of a plasma scenario was highlighted as a particular challenge in the year and good progress was made towards an approach to overcome this challenge.

Alongside the programme’s technical work, the team began looking into the longer term, delivery, management and costs of the STEP prototype plant. Although early, this will be crucial to enabling the success of STEP by underpinning a robust delivery proposal for the next stage of investment. A particular milestone achieved within the year in this regard was the launch of the process to select the site for the STEP prototype plant. Nominations closed on 31 March 2021 with an excellent response and the overall process will conclude towards the end of 2022.



In Focus: STEP siting competition

The STEP prototype plant will be a major facility, employing a large workforce and becoming a globally important site for the development of fusion energy. In December 2020, the process to seek site nominations for STEP was launched by the Secretary of State for BEIS, with 15 nominations received from across the UK. Each nomination will go through several stages of assessment in the year ahead before UKAEA makes a recommendation to the Secretary of State, who will make a final decision on the STEP site. This represents the start of an exciting process to build the first fusion energy plant in the UK targeting 2040.

2/3 MILESTONES ACHIEVED

EUROFUSION DEMO AND RELATED WORK

The European DEMO (DEMONstration power plant) is the EU power plant concept developed by the EUROfusion consortium. Similar to STEP, DEMO targets the production of several hundred MW net electricity from fusion. The DEMO programme follows a longer, though highly ambitious, roadmap based on the more mature approaches of JET and ITER, linking construction decisions to high power fusion results and blanket tests from ITER.

The UK's position within the DEMO and wider EUROfusion programme is through its association to Euratom. In 2020 there was considerable uncertainty around the status and terms of this association as the UK transitioned from the EU. Despite the challenges associated with working under such uncertainty, UKAEA scientists and engineers made several key contributions to the DEMO programme which are set to continue as the next EUROfusion framework programme begins, with substantial participation agreed over the period 2021-2025.

UKAEA supports the EUROfusion DEMO programme through skills, expertise, and capability provided by RACE, Fusion Technology, Tritium systems, materials science, and tokamak science and we were a significant contributor to the DEMO pre-conceptual design review held in 2020. The DEMO programme is divided into around ten work packages, and UKAEA has led and conducted the majority of the remote maintenance design and R&D package since the start of the EUROfusion consortium in 2014. The remote maintenance concept is device-defining as has become even clearer over the last year as various options for the DEMO architecture were rapidly explored to ease the challenge of precise handling of very large (up to 100 tonne) components. These studies addressed the entire maintenance scheme, from maintenance strategy, to movement regions, control, logistics, robotics and tools for in and ex-vessel activities, aiming for a holistic design. Initial designs for testing facilities capable of testing proposed robotic movers for very heavy DEMO items

were produced in the year, targeting items in excess of 10 tonnes with sub-cm precision, along with the first studies of integrated and automated control of the long multi-joint robot arms, modifying a major facility built for JET, and exploring the practicalities of remote cutting and welding in long pipes with bends. Activities were undertaken in the year to establish the experimental part of a research programme for neutron irradiated materials using MRF's capabilities. Although threatened by COVID-19 related delays, all UKAEA activities required to facilitate the transfer of 500 irradiated samples, including potential fusion power plant materials, from the Polish MARIA reactor were completed to a revised schedule. Unfortunately, issues relating to the complex packaging and shipping arrangements of these irradiated samples, outside of UKAEA's control, prevented the completion of the transfer missing this performance milestone, which will be scheduled for the coming year. We continued to make significant contributions in other areas of the DEMO programme including: an assessment of potential 'advanced' designs of the exhaust systems; the pre-conceptual design of the DEMO wall including material choice, surface shaping, cooling strategies, and integration into the wider engineering design; an overarching report on DEMO tritium systems pre-conceptual design which highlighted many valued UKAEA contributions and the value of DEMO work in generating skills for UKAEA to apply to upcoming ventures such as H3AT; and, completion of a 5-year review of waste assessment studies for DEMO, presented to an expert review panel with the work being recognised as a 'notable high point'. Substantial work was completed in the area of plasma exhaust and power handling, with the design of components to handle transient events on DEMO, and a major study on advanced configurations for power handling, in particular trying to translate the super-X divertor concept demonstrated on MAST-U to DEMO. In doing so we found that the design had to be adapted significantly, but that some of the underlying ideas remained extant and large potential benefits remain after many of the engineering constraints are included.



Discussing novel pipe servicing robots

OBJECTIVE 3:

DRIVE ECONOMIC GROWTH AND HIGH-TECH JOBS IN THE UK

Milestones

4/12
MISSED

8/12
ACHIEVED

Performance

Strong collaboration between the UKAEA and the private sector is a key 'pillar' of UKAEA's approach to delivering sustainable fusion energy and will be fundamental to realise the rate and scale of progress that is needed. UKAEA aims to promote and develop mutually beneficial, productive relationships with industry, engaging with the private sector through its four business units to stimulate innovative solutions to technical challenges and develop economic opportunities. A fusion power plant may be decades away, but the economic impact of the fusion programme can be significantly nearer-term. UKAEA is committed to maximising the transfer of innovation, skills and knowledge from fusion into adjacent sectors to provide socioeconomic benefit in different regions of the UK, with the objective of increasing national prosperity, resilience, and sustainability.

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3/3 MILESTONES ACHIEVED

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) and has been critical to UK industry successes in winning ITER contracts in remote maintenance and robotics. RACE leads EUROfusion DEMO remote maintenance designs and continues to provide the operators for JET remote handling systems, successfully completing training for operators prior to JET's planned shutdown in 2021.

Outside of the fusion sector, RACE's profile continues to grow having made several substantial contributions and developments in 2020/21. With responsibility for procuring, installing, and commissioning the European Spallation Source (ESS) Active Cell facility in Lund in Sweden, we completed the first electrical distribution and signalling installation package to schedule despite significant challenges with COVID-19 restrictions preventing travel access to Sweden for RACE personnel and suppliers. RACE's support for the nuclear sector grew in 2020/21, including the signing of a research and technology deployment collaboration in January 2021 on a £12M UK-Japanese robotics project, called 'LongOps' with the first £3M contracts placed in April 2021 to provide robotic arms for testing at RACE and to train operators based in the UK and Japan. Separately, as a partnership between UKAEA, Sellafield, NNL, and the University of Manchester, a new presence in Cumbria is now under development to further explore robotic applications to the nuclear sector.



In Focus: LongOps

Both operating fusion power plants and decommissioned nuclear power plants present challenges for robots, where intense neutron radiation can be damaging to electronics and prevent robotic operation. This challenge has led to significant development of long-reach manipulator robotics in fusion to service and maintain reactors such as JET – potentially important innovations also for nuclear decommissioning. The LongOps project – a world leading UK-Japanese alliance – will develop new robotics and automation techniques based on long-reach robotics applied to both fusion research and nuclear decommissioning in the UK and Japan. Targeting faster, safer decommissioning at TEPCO's Fukushima Dai-ichi reactor in Japan and at Sellafield in the UK, the project will develop and deploy sophisticated digital twin technologies - virtual models where the pairing of virtual and physical worlds allows for highly detailed analysis and testing of operational and maintenance scenarios. Lead by RACE, this four year research collaboration will help to pave the way to deliver new robotic capabilities in fusion and nuclear decommissioning with global potential.

PERFORMANCE REPORT

2/3 MILESTONES ACHIEVED

MATERIALS RESEARCH FACILITY

The MRF is a facility at UKAEA for UK materials scientists in academia and industry that uniquely bridges the gap between universities, where radioactivity limits are low but access is readily available, to nuclear licensed sites where limits are high, but access is strictly controlled. It has benefited from major investment from EPSRC, via the UK's National Nuclear User Facility (NNUF) programme and The Henry Royce Institute for Advanced Materials (Royce) initiatives, alongside direct support from Government. In 2020/21 the MRF transitioned from commissioning to a fully operational facility, achieving a major landmark by obtaining clearance to operate at its full radioactivity design limit. The team demonstrated for the first time, a full process of robotic and remote handling of commercial active samples (irradiated steels) – from sample preparation in the MRF hot cells, through lined trolley transfer to research rooms where analysis using scanning electron microscopy was carried out. The MRF team carried out work for several customers, including CERN and universities across the UK, however limited user access to the facility due to COVID-19 prevented the facility from achieving its ambitious sales targets in the year. The capability of the MRF was enhanced with new equipment, including a 14 Tesla magnet system to test materials in magnetic fields, with future enhancements on the horizon following three out of four successful proposals to the NNUF2a programme to provide new instruments in 2021/22 onwards, and construction of a facility extension as part of the Fusion Foundations programme is underway.

In early 2021 a major exercise was launched early to develop a new roadmap for fusion materials research in the UK, led by the UKAEA materials team, funded by The Henry Royce Institute and facilitated by the Institute for Manufacturing at the University of Cambridge. Community response was enthusiastic, with a final roadmap document to be published in the summer of 2021.

3/3 MILESTONES ACHIEVED

FUSION TECHNOLOGY

The Fusion Technology team consists of specialist technology groups with in-depth skills in a range of areas including neutronics, power plant design, thermal hydraulics, applied materials technology and testing, advanced manufacturing techniques and qualification of components. These groups continue to provide critical input across UKAEA's technical portfolio and support third-party fusion and non-fusion projects on a commercial basis, including for the European Spallation Source and the aerospace industry. As a result, and despite delays in executing works due to COVID-19, the Fusion Technology business unit more than doubled expected commercial income for the year.

Funded by the NFTP programme, the Fusion Technology Facility in Rotherham completed construction and was handed over to UKAEA in September 2020, with a permanent management team in place by December. This establishes a permanent UKAEA presence in Yorkshire within the regional advanced manufacturing cluster further strengthening UKAEA's support and relationship with industry in an important sector for fusion. A major feature of this new facility will be the CHIMERA rig – a globally unique thermal hydraulic testbed capable of exerting simultaneous fusion relevant heat and magnetic loads onto meter scale components. In 2020/21 the detailed design for CHIMERA was completed allowing fabrication of this exciting new facility to begin.

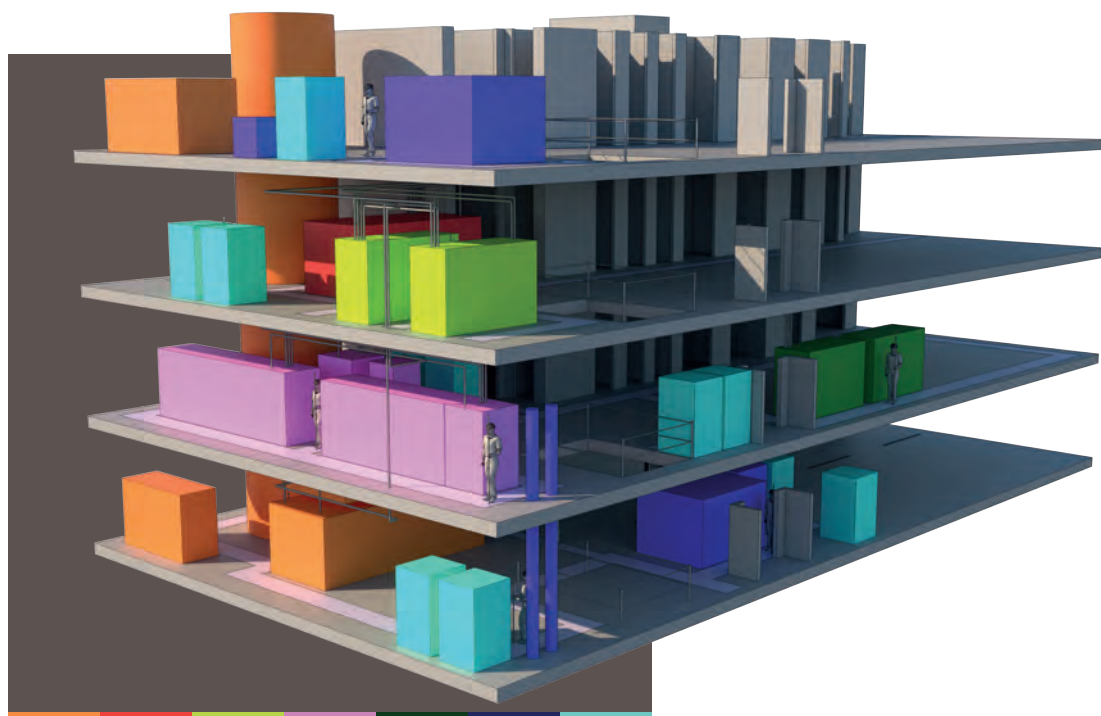
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0/3 MILESTONES ACHIEVED

H3AT

H3AT as a business unit covers a wide range of operational and development activities spanning the broad spectrum of tritium capabilities required for fusion. The team completed the commissioning of JET tritium systems (see page 35) and contribute to UKAEA’s research objectives in tritium science. With funding from the NFTP programme, the H3AT facility will deliver a new world class capability for testing and developing the tritium technology required to fuel a future fusion power plant, supporting UK industry to win significant contracts in ITER and developing the next generation of UK tritium technologists. Construction of the H3AT facility progressed significantly in the year and the team completed a concept design for the ‘ITER relevant tritium loop’ – a process pilot plant designed with ITER to demonstrate the ITER fuel cycle at

1/20th scale. Detailed design of this facility is ongoing with industrial partners, targeting assembly in 2022/23. Despite these successes the development of the concept design for the H3AT facility was significantly delayed in the year resulting in all related milestones completed later than scheduled, primarily driven by the technical challenges posed by the uniqueness and complexity of the facility. A key success factor for H3AT is engagement with industry and partners, and a number of supplier engagement events and activities were held in the year to ensure UK industry are up to date with opportunities presented by H3AT. A new technical collaboration with ITER was set up in the year to specialist input into the H3AT facility and maximise the benefits it brings to the UK.



Isotope Separation System (ISS) Storage and Distribution (SDS) Torus Vacuum Simulation (TVS) Hydrogen Purification System (HPS) Analytical System (ANS) Water Detritiation System (WDS) Electrical and Control Panels (ECP)

OBJECTIVE 4:

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

Milestones



Performance

UKAEA uses its unique assets at Culham, Harwell and in Yorkshire to host our research facilities and our people, and develop ‘clusters’ of focused R&D and commercialisation and will use these to contribute to national prosperity, resilience and sustainability, and to deliver the fusion mission. In line with this strategy, the triannual re-valuation of Culham Campus resulting in a significant increase in asset value this year as the campus was moved out of the Green Belt due to the adoption of the local plan, and outline planning permission was gained for development of the site’s western flank. Place is important and, whilst our main base of activities remains on Culham Campus, our presence is expanding into regions elsewhere where the local ecosystems can help us to deliver our mission and where the delivery of our mission can bring local socioeconomic benefit and strengthen the national R&D capability.

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1/3 MILESTONES ACHIEVED

BUSINESS DEVELOPMENT AND INNOVATION

UKAEA's unique facilities, expertise, and capability provides rich opportunity for spin-out and innovation transfer and provides a powerful platform to support a thriving private sector in fusion and beyond. With new funding through the Fusion Foundations programme efforts are ongoing to enhance current and develop new facilities to improve the offering for private tenants on Culham campus as a cluster for fusion technology companies. COVID-19 caused a drastic slowdown in discussions causing delays to associated milestones, though progress has increased since restrictions have eased in 2021 setting the stage for an active year in 2021/22. One particular area of success in the year, although delivered later than planned, has been the co-design of a new facility on Culham campus with the private sector fusion company General Fusion. On 17th June 2021, an agreement was signed between UKAEA and General Fusion to site this facility on Culham Campus in a building owned by UKAEA on long-term lease. This is an exciting development demonstrating the attraction and pull of Culham Campus as the hub for a global fusion cluster.

The fusion sector is rich in innovation and several new initiatives were kicked off in 2020/21 to stimulate and harness innovation. Internally, a dedicated and timebound project to identify new commercial opportunities from fusion innovations provided open and targeted opportunities for teams to explore the spin-out potential of their ideas, identifying a number of possible avenues for commercialisation in its first 12 of 18 months. Externally, two new projects were undertaken to stimulate fusion innovation in the private sector through industrial challenges - the first, run in 2020/21 as a small scale pilot conducted under existing frameworks, informing the second, a new innovation challenge scheme announced in May 2021 and deployed with InnovateUK offering up to £250k funding to deliver feasibility studies for innovative solutions to challenges focused on fusion fuelling systems and digital engineering.

2/2 MILESTONES ACHIEVED

CULHAM SITE IMPROVEMENT AND CAMPUS DEVELOPMENT

UKAEA operations and property interests are predominantly based across three sites: Culham, Rotherham and Harwell. Culham campus is one of the three large internationally significant science and business centres in southern Oxfordshire, underpinning the County's economic growth and is the base for the majority of UKAEA activities and tenants. Investment on Culham campus in RACE the MRF, OAS, and other building projects is already enabling industry locally and across the nation with new skills and capabilities, supporting industry to win contracts from ITER, and providing the hub of an international fusion cluster. The continued development of the campus through the NFTP and Fusion Foundations programmes is expected to enhance this creation of jobs and provide economic growth both locally and nationally. In 2020/21 a major extension to the RACE facility, funded by Fusion Foundations, was completed to expand the working and technical space in the facility, catering for a rapidly growing team to meet the needs of the fusion and adjacent sectors. Likewise, an extension to MRF broke ground with completion expected in late 2021, doubling the hot-cell capacity and increasing office space to bring the facility to full capability. Both projects suffered schedule delays as site access was restricted during the first pandemic lockdown, however after safety procedures were established and restrictions lessened mobilisation was quick and both projects met milestone dates. Construction progressed significantly on the NFTP funded H3AT facility on Culham campus, whilst the Fusion Technology Facility in Rotherham was completed and handed over to establish UKAEA's first permanent presence outside of Oxfordshire in a decade. With the adoption of the South Oxfordshire Local Plan and consequent removal of Culham campus from the Green Belt, major upcoming development of Culham campus is expected in 2021/22 and onwards.

With the move to remote working for a significant fraction of the UKAEA workforce, an unexpected opportunity arose in 2020/21 to undertake a major programme of refurbishment whilst facilities were largely un-used. Activities including the refurbishment of major conference facilities, the enhancement of audio-visual equipment in shared meeting space, preparation of office space for hybrid working arrangements, and expansion of capacity in shared recreational areas were kicked off in 2020/21 to be ready for post-pandemic working arrangements in 2021/22.

The Harwell Campus is now one of the fastest growing science and innovation environments nationally, with employment on the Campus increasing from 4700 in 2014 to over 6000 working in 200 different organisations. Together with STFC, UKAEA holds and manages the public sector's share in the joint venture Partnership which was established to develop the Campus. In 2021 Brookfield took over as the private sector partner in the JV. This catalysed a revision of the business plan and campus strategy. Notable developments in year include the Vaccine Manufacture Innovation Centre which has been built in record time and aims to support the national effort in developing and manufacturing new vaccines. In addition, the JV completed the Zeus development and started another two (BEPO and Quad Two), as well as various refurbishments. Demand for space remains very strong despite the pandemic.

2.5/3 MILESTONES ACHIEVED

FUSION FOUNDATIONS

2020/21 was the first year of the £184M Fusion Foundations programme, announced by the Science Minister in 2019, with a mission to “deliver facilities, infrastructure and skills to enable world leading fusion and innovation in the UK”. From a standing start and under the challenges of the rapid move to remote working, the programme has successfully developed its management office and rolled out programme governance to the 20 infrastructure, facility, and skills projects underlying the programme. The programme began the majority of projects in the year, with some delays encountered due to the wide-ranging impact of COVID-19 on project delivery. Concept designs for several new facilities on Culham campus were completed in the year, developed with high sustainability ambitions and to enhance the offering to the UKAEA workforce, commercial tenants, and apprentices. These include: a new flagship office building providing modern, flexible, and collaborative UKAEA office space for up to 600 to replace aged and end-of-life stock; a new commercial tenant building; and an expansion to the OAS centre allowing a major expansion of the apprenticeship offering to higher levels, with greater than double capacity. At the same time, a major transformation of UKAEA IT systems to better serve staff and tenants and increase efficiency began. These and the other exciting projects within the programme will continue across the next four years to enhance Culham campus, establish a fusion cluster, and enable continued world leading fusion science and innovation in the UK.



In Focus: OAS

The Oxfordshire Advanced Skills academy, born out of UKAEA's existing apprentice training programme, provides high quality training for apprentices in engineering to local businesses across a range of technical sectors. This purpose-built facility owned by UKAEA and run by The Advanced Manufacturing Technology Centre (AMTC) as the official training provider can accommodate up to 350 apprentices per year. Apprenticeship training up to Level 4 is available and, with plans to expand under the Fusion Foundations programme, training up to Level 7 will become available in future years. The facility allows apprentices to train in labs and workshops in engineering disciplines such as mechanical, electrical, robotics, and cryogenics.

3/3 MILESTONES ACHIEVED

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. 2020/21 was another year of growth for UKAEA, with the organisation reaching a milestone headcount of 2000 employees and agency contractors working on behalf of UKAEA. This growth continues to be driven by the delivery needs of UKAEA's widened portfolio with recent Government commitments to the STEP and Fusion Foundations programmes, and our continued international commitments. In total across 2020/21 273 new starters joined UKAEA alongside 145 promotions. A new recruitment system was rolled out to streamline the process, making it more manageable for recruiters and candidates. Since the rollout of the new system 4328 applications have been made (data from May 2021). Shortages remain in areas such as control & instrumentation technicians, engineers (cryogenic, electrical, systems, process, mechanical, design), technical project managers, plasma physicists, procurement officers, project managers, and other specialists. These are being addressed through a variety of recruitment campaigns, including targeted social media, recruitment fairs and hard copy adverts, and in discussion with our sponsoring department BEIS. Nevertheless, recruiting and retaining skills in key shortages areas remains a key area of focus.

UKAEA is dedicated to training and developing current and future generations for the fusion

PERFORMANCE REPORT

sector and other technical industries. 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. Through OAS, UKAEA's workforce contains 96 apprentices, exceeding the Government's 2.3% target for the public sector, with 30 apprentices joining in 2020/21 – a record for UKAEA. UKAEA's apprenticeship training was nationally recognised this year as UKAEA was named a 'Top 100 apprenticeship employer' and won 'Advanced Apprenticeship training provider of the year 2020' awarded by the Institute of mechanical Engineers. Alongside apprenticeship training, UKAEA employs 73 graduates on a graduate leadership scheme, and supports more than 100 PhD students through supervision and access to expertise and facilities. Internally, development of the next generation of UKAEA leaders has been a focus in 2020/21, with several new initiatives enacted including the procurement of a provider for a new leadership training programme with an initial cohort of 100, the development of a leadership forum to discuss aspects of modern leadership to a wide and varied audience, and the first year of the new Strategic Engagement Committee to engage a diverse group of future leaders in key strategic thinking to support the Executive Committee.

UKAEA is committed to promoting equality, diversity, and inclusion inside and outside of the organisation, and to ensuring that the working environment is welcoming, supportive, and inclusive for all. In 2020 we launched a 'Being Inclusive' strategy as a five-year campaign co-ordinating a series of actions centering around four main commitments:

- ▶ **People:** "UKAEA will take positive action to improve the opportunities and lived experience of all individuals working at, or interacting with, the organisation."
- ▶ **Environment:** "UKAEA will take positive steps to identify and improve the physical working environment for all of its people, particularly those with disabilities, whether they are visible or hidden."
- ▶ **Communication and engagement:** "UKAEA will improve internal and external communications to fully reflect its EDI commitment and progress to maximise the awareness and engagement of all stakeholders."
- ▶ **Policies and practices:** "UKAEA will integrate equality, diversity and inclusion into all our policies and practices."

PERFORMANCE REPORT

Historically UKAEA has focused efforts on addressing the STEM gender imbalance, however, our Being Inclusive strategy expands this view and considers increasing our diversity and driving our inclusivity in the widest possible sense with commitments to be taken in regard of all protected characteristics. Each protected characteristic has an Executive Sponsor, a member of the UKAEA Executive Committee who has committed to championing our people and efforts within the characteristics within the organisation. We now have developed employee networks for Women, BAME and LGBTQ, and our Executive Sponsors are championing more. Alongside the Executive Sponsors are a team of 'Inclusion Ambassadors' embedded throughout the organisation who champion our strategy and organise regular events that complement national initiatives such as Black History Month and Neurodiversity Celebration Week and many others beside. Our Executive Sponsors and Inclusion Ambassadors are supported by an EDI Business Partner. To further drive the delivery of our strategy and measure our progress we have developed a Being Inclusive Project Board to deliver our action plan, and an Inclusion Council, chaired by a UKAEA Non-Executive Director, to advise and guide the overarching strategy. As part of this plan we have developed and are implementing EDI impact assessment methodology to inform policies, processes, and projects, advertising all UKAEA roles on EDI job boards, and will create a new UKAEA careers website which will promote EDI within UKAEA and encourage applications from under-represented groups.

UKAEA is currently accredited with an Athena Swan Bronze award for gender equality, and, as part of the Being Inclusive strategy, we are targeting Athena Swan Silver in the next submission.



UKAEA's workforce demonstrates a diverse demographic from 47 different countries and a broad age profile from 18 to 65. UKAEA is impacted by the wider gender imbalance in STEM subjects, which is particularly acute in physics and engineering subjects. Our workforce is 24% female and 76% male with a gender pay gap of 16%. Within the last 5 years female representation on UKAEA's science programmes has grown by 5% with 22% of UKAEA science roles held by women, whilst representation has increased to 10.4% of UKAEA's engineering job roles (an increase from 10% in 2019). Although encouraging and in line with the wider and deep rooted gender imbalance in STEM, we recognise that this is far from our aspiration and continue to seek out new opportunities to encourage under-represented individuals into our programme.

We have implemented a number of initiatives to increase gender diversity in our programme such as signposting internal career progression routes more clearly which has led to drive more female promotion; offering a mentoring scheme; publicising our family-friendly policies, including a buddy scheme to support new parents at work and advertising flexible working on almost all job advertisements; and introducing hybrid working to all employees, subject to role requirements. We are an active member of the Nuclear Institute's Women in Nuclear (WiN) group and providing speakers for outreach engineering events as well as ensuring our extensive programme of hosted, local and national outreach activities is inclusive and actively encourages young women (and their parents) to see science, technology, engineering and mathematics (STEM) as a future career. Our recruitment adverts are scrutinising for hidden gender stereotyping with removal of male/female bias in wording.

3/3 MILESTONES ACHIEVED

SAFETY AND QUALITY

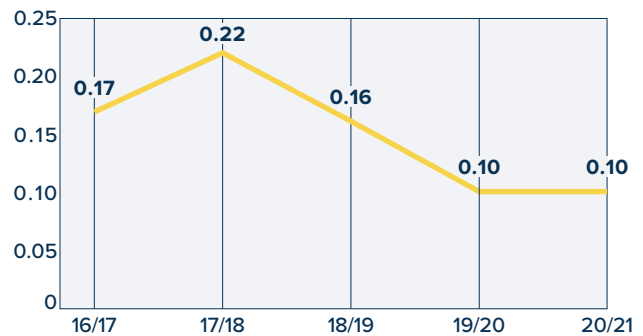
Safety is our top priority, and this underpins all activity that we undertake. As part of this the need to support the health and wellbeing of our people is fully recognised. Our COVID-19 response has underlined our commitment to safety and to our people's health and well-being. We have augmented our 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 Committee, Assurance Committee and Board Assurance Committee (disbanded in November 2020, see page 88). Performance covers both leading and lagging measures. Lagging indicators have consistently indicated good performance, however in a push to develop our culture towards a more proactive one in 2020/21 we have adapted a more agile reporting approach 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 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.

Accident Frequency Ratio

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



In 2021 UKAEA were awarded a President's Award from the Royal Society of the Prevention of Accidents. The RoSPA President's Award is given to organisations on achieving ten consecutive years of Gold

Awards – the highest award standard offered. The President's Award recognises UKAEA's commitment to continuous improvement in accident and ill-health prevention at work. It also reflects UKAEA's site commitment to implementing excellent health and safety standards, for which all UKAEA employees and contractors are commended. The award covers the challenging times faced by UKAEA during the COVID-19 Pandemic and is a testament to the way all working for UKAEA stood up to managing health, safety, and wellbeing challenges during that period.

UKAEA maintains an effective level of security risk management at Culham Science Centre aligning closely with the BEIS security strategy and works to the Cabinet Office functional standard – GovS 007:Security. Security 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 government provided 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.

UKAEA is currently 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. Further improvements have been undertaken to support the planned migration

from OHSAS 18001:2007 to ISO 45001:2018 during the summer 2021.

The 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. Further improvements have included updates to the central documented management system library, with improved access and search functionality enabling all staff to obtain the required documentation for their processes. Additional recruitment within a number of areas including safety & health, health physics, business resilience and quality has enabled a business partner model for these functions to be rolled out across the organisation. These changes are supporting the development of UKAEA's management of quality, safety, health and environment in support of the organisation's overall mission and goals.

FINANCIAL REVIEW

UKAEA Group incorporates the results of United Kingdom Energy Authority, AEA Insurance Ltd and UKAEA's share of trading results and net assets of the Harwell Science and Innovation Campus Joint Venture. The Annual Accounts on pages 112 to 144 provide the financial statements and further information. The key highlights are presented below:

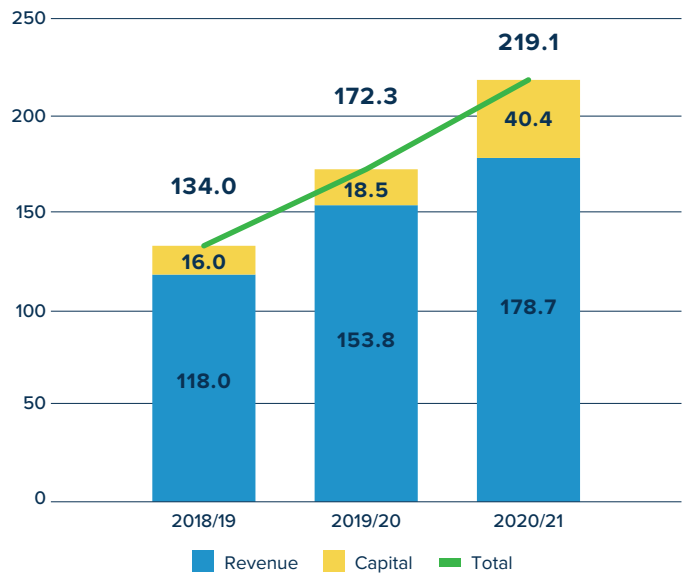
Over the last 3 years, funding has increased to enable the growth in science and research, operational funding for the experimental fusion programmes and investment in facilities.

Total Income	£219.1m
Revenue Income	£178.7m
Capital Income*	£40.4m

+27% since prior year

*Capital Income reflects the Fixed Asset Additions (see Note 11 of the Financial Statements).

Funding Profile over last 3 years (£m)

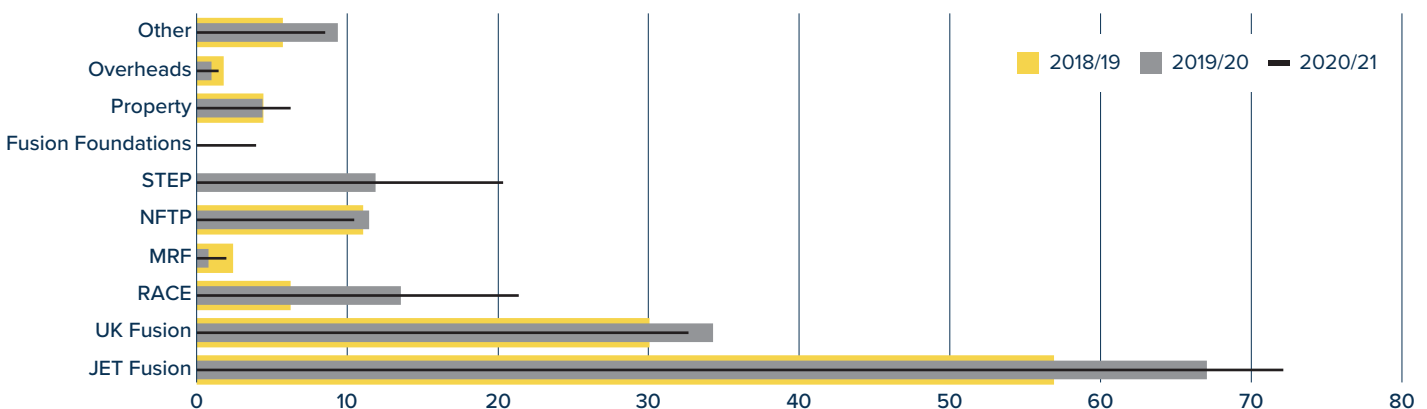


Revenue £178.7m

The majority of the income is from our sponsoring department – BEIS £95.6m. This is in respect of a series of major ongoing 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 £37.1m. The activity related to European grants has remained fairly flat over the 3 year period. During 2020/21, the existing multiyear EUROfusion Framework Programme (FP8) came to its scheduled end, the new FP9 has not yet been formalised by the European Commission and therefore £5.1m of EUROfusion funding will not be recognised until this is finalised in 2021/22, resulting in a reported income reduction in comparison to prior years. In 2019/20, funding for the operation of the MAST and JET experiments was transferred from EPSRC to BEIS, with EPSRC maintaining responsibility for Fusion Research, which has remained broadly flat over the 3 years. A new Fusion Foundations programme commenced in the year to enhance infrastructure, facilities, and skills to enable world leading fusion and innovation in the UK.

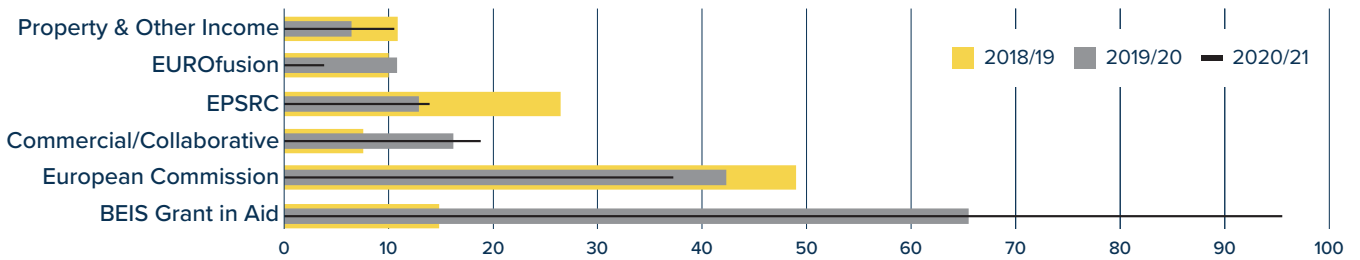
The science and research activity at UKAEA is split into programmes / business units, the performance of which is outlined in the Performance Report.

Income by Programme - 2020/21 vs previous two years (£m)



PERFORMANCE REPORT

Income by Source - 2020/21 vs previous two years (£m)



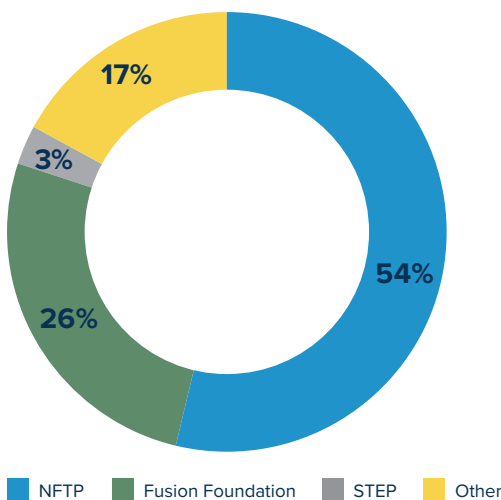
Capital Income / Expenditure £40.4m

Development of science and research facilities at Culham and Rotherham have continued during the year under the National Fusion Technology Programme, with construction costs of new buildings in progress and the commencement of contracts for the plant and machinery required to deliver the equipment for the scientific programmes, anticipated to complete in 2023. The Fusion Foundation programme has also been a large contribution to the increase in Fixed Assets, with completion of an extension to RACE facilities, IT transformation programme and improvements across the campus.

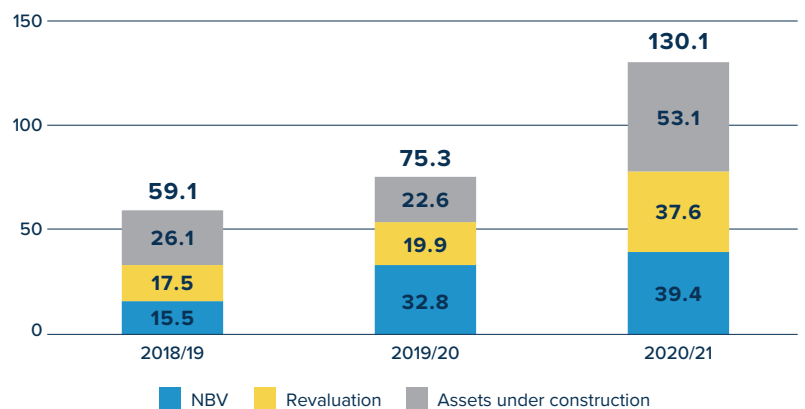
Source of funding is predominantly our sponsoring department, BEIS, with £3.5m of expenditure funded through collaboration and external grants.

The value of Fixed Assets has also been positively impacted by the revaluation of land as the campus was moved out of the Green Belt due to the adoption of the local plan and outline planning permission was gained for development of the site’s western flank. This is reflected in an increase in valuation increase of £18m.

2020/21 Capital Expenditure by Programme Area



Property, Plant & Equipment (£m)

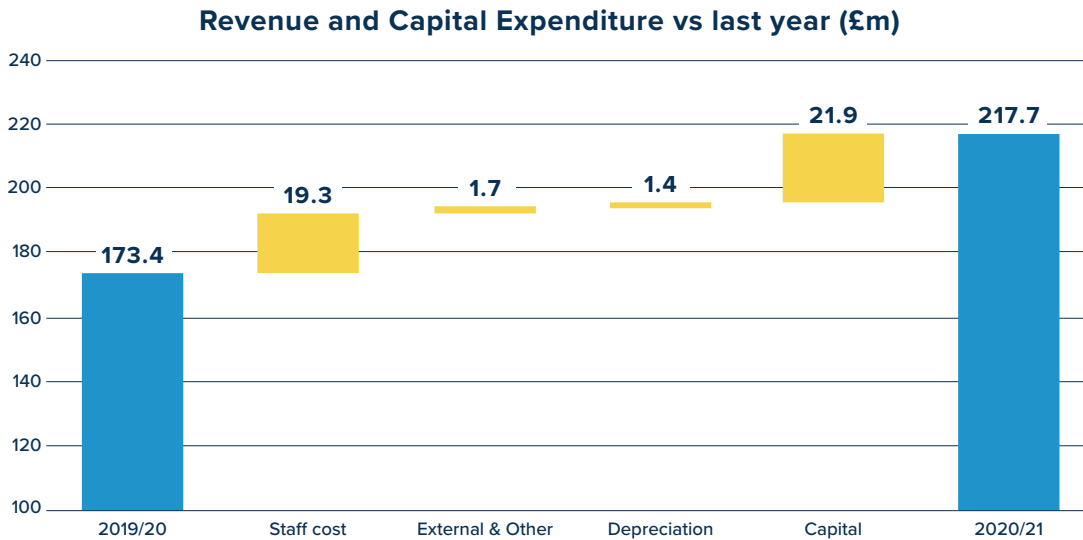


FINANCIAL REVIEW

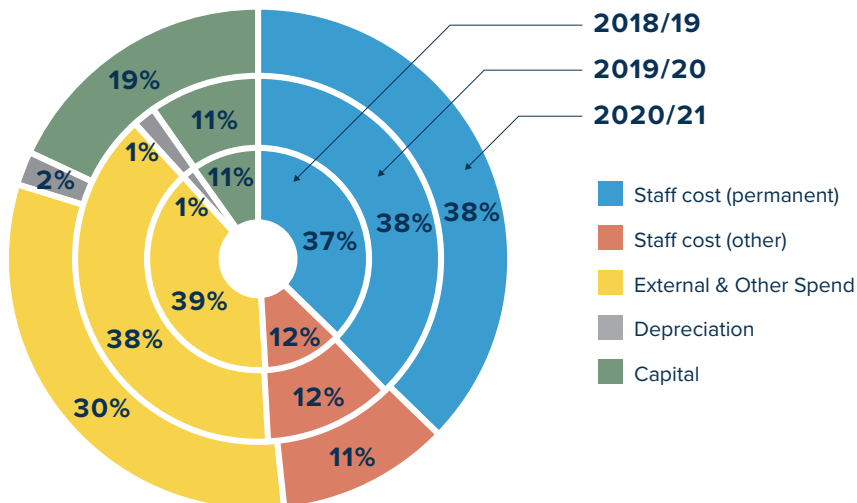
WHAT DO WE SPEND IT ON?

UKAEA spends most its revenue 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.

Expenditure, net of costs capitalised, was £22.4m higher than in 2020, Capital additions were an incremental £21.9m. The majority of these increases relate to staff costs and construction, respectively.



Expenditure by Type (including Capital)



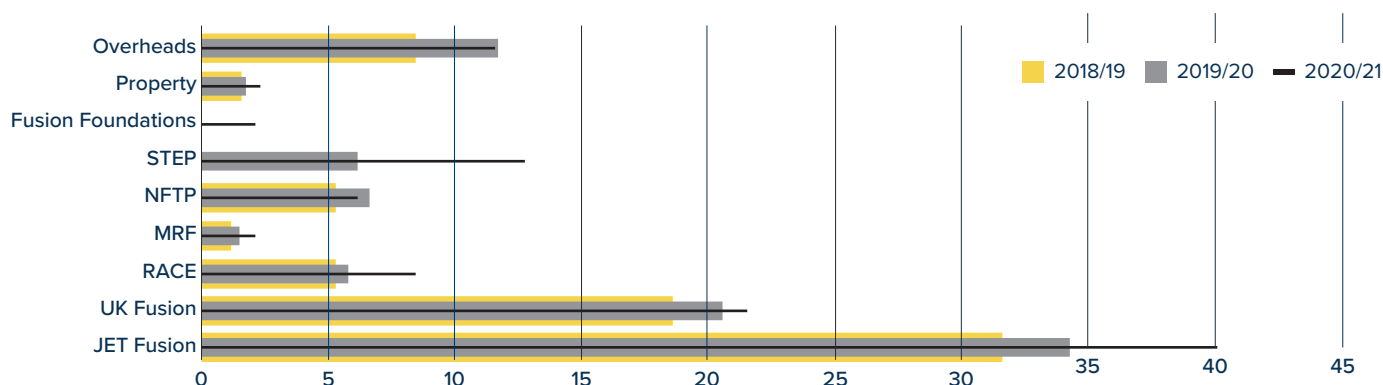
External & Other Spend includes a rounding adjustment +/-1%pt

Performance

PERFORMANCE REPORT

Staff costs have increased year on year, driven by the expansion of programmes such as STEP, new programmes starting in the year - Fusion Foundations and JET Repurposing project.

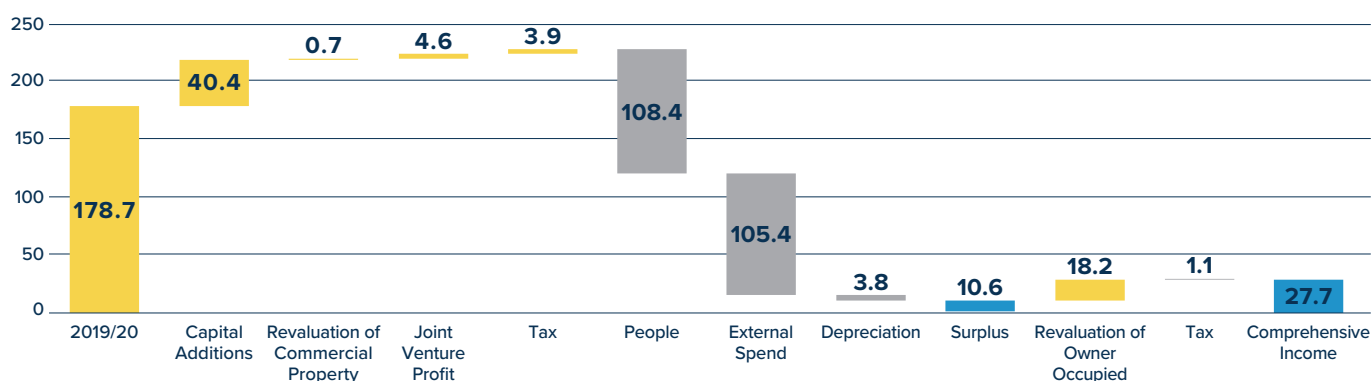
Staff Cost by Area - 2020/21 vs previous two years (£m)



Overall Outturn

In 20/21 there was an overall surplus at a Group level of £10.6m (2020: £6.3m).

Financial Performance in 2020/21 (£m)



Income includes recognition in year of £4.1m income relating to capital additions rather than deferring as a capital grant. This is in accordance with HMT guidance, as relates to grant income from other government sources. The profit from the Harwell joint venture is £4.6m, resulting largely from an increase in the Fair Value of the investment properties managed by the Harwell JV, as well as an improvement in operating profit due to increased income in the financial year.

Tax credit of £3.9m, driven by £5.3m relating to Research and Development Expenditure Credits (RDEC). These gains are slightly offset by depreciation, resulting in the overall surplus of £10.6m.

Revaluation of property gains (net of tax impact) extend the Total Comprehensive Income for the year to £27.7m (see Financial Statements for further information).

Provisions - A key item on UKAEA Balance Sheet is the provision for site restoration:

UKAEA hosts the Joint European Torus (JET) facility at Culham. 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). 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 £443.1m.

BEIS, as Sponsoring Department, provides UKAEA with a Letter of Comfort that it will cover the cost of decommissioning JET, UKAEA therefore recognise an opposing receivable. This provision is recognised by BEIS within its Annual Accounts.

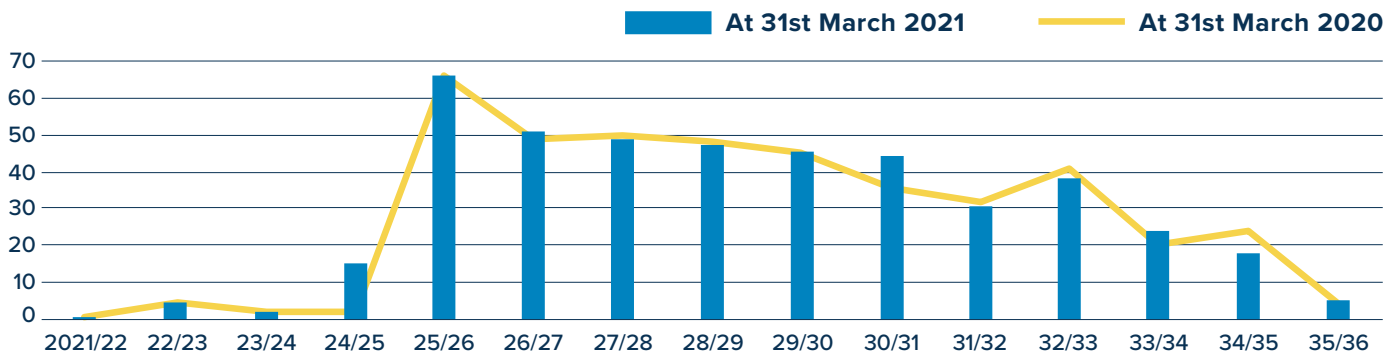
PERFORMANCE REPORT

The provision is reviewed annually, the below graph shows the current planning assumptions compared to last year. Overall, a 3% increase year on year due to a review of discrete risks (which has increased the planned contingency) and cost inflation. The phasing has also been reviewed, with a slight pull forward of spend.

The European fusion community have recently determined that the future scientific programme for JET should continue to the end of 2023. EUROfusion have submitted this proposal for evaluation by the European Commission before a budget is set later this year. Once that final timeline is confirmed, we will reassess the phasing of the JET Lifetime Plan, though do not anticipate significant changes in the overall provision.

A programme to identify potentially lower cost alternatives to JET decommissioning, which exploits opportunities for technology innovation and re-purposing of JET facilities and infrastructure is underway, with £19.7m funding provided by BEIS from 2020/21 to 2024/25.

Decommissioning Spend Estimate (£m)



See Financial Statements note 20 for further information

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 together with our strategy and objectives for reducing our impact. In line with GGC requirements we also report 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 2020/21, UKAEA's annual energy usage and greenhouse gas emissions have decreased compared to the previous year due to periods of reduced activity and remote working as a result of the COVID-19 pandemic. However, emissions were still higher than in the two years prior to this, which is the result of the JET and MAST experiments running in full operation once the site reopened.

SUSTAINABILITY STRATEGY

Early in 2021, the UKAEA Executive Committee have reviewed and approved our first Sustainability Strategy document. UKAEA is committed to contribute to long-term environmental sustainability. It is this ambition that forms the focus of this strategy, together with the ways in which we are planning to achieve that. This document outlines the main sustainability aspects related to UKAEA's operations as well as our plans for addressing these and the rationale behind the adopted approach.

In 2019, the UK became the first major economy to set a legal target of reaching net zero greenhouse gas emissions by 2050. Fusion will be a vital part of a future low-carbon energy production and the UK is a global leader in developing this transformative technology. Our plan is for fusion to contribute to a sustainable energy future in the second half of this century and beyond, alongside a range of other technologies including advanced fission and

renewables. Until then however, we need to deliver our world-class research in an energy efficient manner to minimise the impact we have on our environment and help meet the net-zero targets. This strategy has been developed in line with the principles and themes adopted by the Greening Government Commitments (GGC) and the BEIS Sustainability Strategy, demonstrating our commitment to support these wider initiatives.

In line with GGC requirements, the UKAEA currently reports Scopes 1 (direct emissions) and Scope 2 (indirect emissions from power consumption), along with the business travel aspect of Scope 3. The organisation does not yet formally report on the rest of the scope 3 emission categories (i.e. all other indirect emissions). However, an internal study has recently been undertaken which did an initial analysis of all Scope 3 categories applicable to UKAEA. Initial estimates show that these are a significant part of UKAEA's carbon footprint and are therefore included in the scope of this strategy as an area of focus for further data collection and future development of targets.

Running fusion experiments is a highly energy-intensive activity and represents a short-term emissions cost as an investment in a much longer-term sustainable future. For this reason, fusion related emissions (such as the energy used for JET pulses), which are part of our Scope 1 emissions, are excluded from targets so as not to impact the development of fusion energy. This is also the reason UKAEA is exempt from the GGC operational targets. Therefore, the Strategy is focused on reducing emissions in all our other Scope 1, 2 and 3 categories, which are common to other organisations and not directly driven by the fusion experiment programmes.

Depending on whether data is already available for certain emission categories and what UKAEA's level of control is in these areas, different targets and objectives have been defined. Targets are defined as quantitative, measurable emission reduction goals for activities which UKAEA can directly control (i.e. reduce the operational emissions of new buildings to net-zero by 2030). Objectives are defined as qualitative goals for measuring and helping to reduce emissions in areas where the UKAEA does not have direct control but can exert an influence (i.e. collect data on employee commuting distances and improve infrastructure to encourage employees and tenants to use more sustainable ways of travel).

Targets related to the design and construction of new buildings

- All new standard buildings will be designed to BREEAM Excellent and at least an extra 40% carbon reduction against the compliant base level, in line with government requirements and the Local Plan. In addition to this, UKAEA is seeking to achieve operational carbon neutral status ahead of the RIBA 2030 target by a combination of design and offsetting for all standard buildings beginning construction in 2021 or after. Offsetting will be used only after the energy demand of the building has been reduced to the RIBA recommended levels, and after renewable energy generation on site has been adopted where feasible.
- All new buildings to have low embodied carbon, in line with the targets set by the RIBA 2030 Challenge. Typically, this is facilitated by the BREEAM Excellent requirements. However, UKAEA will incorporate sustainability criteria into the selection of materials to drive this even lower where possible.
- Make electric supply the default option for all activities in new buildings.

SUSTAINABILITY REPORT

Short-term objectives related to other emission sources

- Undertake surveys and improve energy monitoring for the existing estate to identify the buildings and aspects that present the most opportunity for improvement; then use this to develop energy efficiency targets and a net-zero trajectory for the existing estate.
- Map the highest consuming categories of non-fusion plant and equipment and explore ways to make efficient options the default when replacing or purchasing this equipment.
- Gather more data and explore ways to reduce impact in other areas such as owned and hired vehicles, fluorinated greenhouse gases, long-distance business travel, employee commuting, waste and purchases goods and services.

Long-term objectives related to other emission sources

- Improve the energy efficiency of the existing estate and replace end-of-life buildings where these cannot be repurposed.
- Incorporate low Global Warming Potential refrigerant selection in the specification and procurement process for new equipment.
- Encourage use of sustainable transport for short-distance business travel.
- Engage highest contributing suppliers to gather specialised data and collaborate to reduce emissions in the supply chain.
- Provide improved welfare facilities to encourage running and cycling.
- Work with local transport authorities to consolidate and extend public transport services to Culham Science Centre.

BIODIVERSITY AND WATER

In addition to reducing emissions, the UKAEA is also developing a Biodiversity Strategy as part of the Culham Site Masterplan, to reduce and mitigate the impact of all new developments on site. This strategy adopts a Sequential Mitigation approach which means that when there is a new development on site that leads to some loss of biodiversity, On-Plot mitigation is considered as a first option (i.e. through a green roof). If that is not deemed feasible or it does not fully mitigate the impact, then On-Site but Off-plot measures are considered (i.e. improving the biodiversity of other areas on site). After that, Off-Site mitigation is used to offset the remaining balance (i.e. by making a payment to the local council per 'unit' of biodiversity to be offset, which can be used to improve biodiversity in other local or national areas).

As part of the Masterplan and BREEAM targets, UKAEA is also committed to adopt Sustainable Drainage Systems (SuDS) as part of all new developments, as well as efficient systems to minimise water use throughout the lifetime of the building.

SUSTAINABILITY ACHIEVEMENTS IN 2020-21

In addition to the release of the Sustainability Strategy, other projects have also been progressed during 2020-21 including:

- A second bus route introduced which connects the site to one of the nearby towns.
- Two electric vehicle charging points have been installed on site.
- Surveys undertaken for installing additional PV panels on newer buildings.
- Improvements to metering and energy monitoring systems.
- Efficiency improvements to high consumption HVAC systems.
- Lighting replacement with LEDs as part of building maintenance work.
- An initial analysis of our Scope 3 emission categories.

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.

GOVERNANCE AND DECISION MAKING

The Sustainability Strategy is reviewed and approved by the UKAEA Executive Committee. Sustainability projects are owned by the relevant teams across the organisation and are supported by the Environment Advisor. All updates related to sustainability achievements and strategy are communicated internally through regular staff talks, 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 also been established.

Progress against sustainability objectives is reviewed regularly as part of the relevant UKAEA forums and committees. Recommendations and aspects requiring higher-level decisions are presented to the Executive Committee. Yearly progress on the objectives is reported as part of the Sustainability Section of our Annual Report. In light of new progress and findings, the Strategy is to be reviewed and re-issued annually.

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.

SUSTAINABILITY REPORT

20% reduction in GREENHOUSE GAS EMISSIONS



1

SUSTAINABILITY IS OUR PRIORITY

UKAEA has adopted a new Sustainability Strategy in the last year which demonstrates our ambition and commitment



2

ADAPTING TRANSPORTATION

A new bus service to and from site and a lift-share scheme are in place. To support the UK's transition to electric vehicles, charging points are being installed in all new car parks

12% reduction in ENERGY USE



3

BIODIVERSITY

We are encouraging our site wildlife by suitable plantation of trees & shrubs, maintaining our Bee Orchids and composting on site



4

PLASTICS REDUCTION

We are continually reviewing our use of plastics with single-use items wherever possible



5

ENERGY

A budget for refurbishment has been achieved



6

CLIMATE CHANGE ADAPTION

All new standard buildings will be designed to BREEAM Excellent and at least an extra 40% carbon reduction against the compliant base level

53% reduction in **LANDFILL**



7

LONG-TERM SUSTAINABILITY GOALS

Adoption of legally binding net zero carbon emissions by 2050, with interim targets for 2030 & 2040

14% reduction in **ELECTRICITY: NON-RENEWABLE**



8

GOVERNANCE

The recently formed Sustainability sub-committee has successfully overseen the new strategy implementation and continued support with Director sponsorship

54% reduction in **TOTAL WASTE**



9

AND LAST BUT BY NO MEANS LEAST ... OUR JOURNEY

UKAEA's mission is to continue to deliver sustainable fusion energy as a carbon free abundant energy source for the future

ENERGY EFFICIENCY
Budget is allocated to building
replacement plans to
achieve energy savings

SUSTAINABILITY REPORT

Summary of financial and non-financial sustainability information for 2020/21

Area		2017/18	2018/19	2019/20	2020/21
Greenhouse gas emissions (1,000 tCO ₂ e)		15.4	15.6	22.1	17.6
Estate Energy	Consumption (mill kWh)	36.1	49.8	77.8	68.7
	Expenditure (£k)	4,055	5,686	9,345	7,249
Estate Waste	Amount (tonnes)	503.0	659.2	643.8	297.9
	Expenditure (£k)	345.5	370.50	319.05	124.36
Estate Water	Consumption ('000 m ³)	62.7	98	92.9	98.6
	Expenditure (£k)	144	279	206	276

Greenhouse gas emissions

Greenhouse gas emissions		2017/18	2018/19	2019/20	2020/21
Non-financial indicators (1,000 tCO ₂ e)	Total emissions (Scope 1-3)	15.4	15.6	22.1	17.6
	Gross emissions Scope 1 (direct)	1.45	1.20	1.32	1.76
	Gross emissions Scope 2 & 3 (indirect)	13.9	14.4	20.8	15.8
Related energy consumption (million kWh)	Electricity: Non-Renewable	29.8	44.7	72	62
	Electricity: Renewable	-	-	-	-
	Gas	6.33	5.01	5.8	6.7
	LPG	-	-	-	-
	Other	-	-	-	-
Financial indicators (£k)	Expenditure on Energy	4,055	5,686	9,345	7,249
	CRC Licence expenditure	411	330	0	0
	Expenditure on accredited offsets	0	0	0	0
	Expenditure on official business travel	569	677	655	42

Note: 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>. The emissions categories we currently report under Scope 3 are: energy transmission and distribution emissions and business travel.

PERFORMANCE REPORT

Waste Disposal

Waste		2017/18	2018/19	2019/20	2020/21	
Non-financial indicators (tonnes)	Total waste disposed of	503.00	659.20	643.79	297.89	
	Hazardous waste	Total	24.48	19.89	30.49	16.87
		Non-hazardous waste	Landfill	13.36	56.36	40.30
	Reused/Recycled		270.94	409.16	394.20	200.03
	Composted		37.36	33.84	36.72	7.04
	Incinerated (energy recovery)		100.10	99.04	102.32	40.29
	Incinerated (no energy recovery)		0.07	0.03	0.00	2.36
	Total non-hazardous waste		421.83	598.43	573.54	268.53
	Radioactive	Produced	40.94	50.05	49.81	31.46
		Disposed	56.73	40.88	39.76	12.49
	OSR (see note below)	Produced	36.49	9.81	25.63	7.55
Incinerated (no energy recovery)		-	-	-	-	
Total Radioactive / OSR waste disposed of		56.73	40.88	39.76	12.49	
Financial Indicators (£k)	Total disposal cost	345.50	370.50	319.05	124.36	
	Hazardous waste disposal cost		24.00	16.50	25.20	19.77
	Non-hazardous waste disposal costs	Landfill	2.00	4.00	16.50	3.83
		Reused/recycled	41.00	30.00	64.43	12.21
		Composted	1.50	1.00	1.59	1.95
		Incinerated (energy recovery)	21.00	20.00	24.33	8.58
		Incinerated (no energy recovery)	-	-	-	-
	Radioactive	Disposed	256.00	299.00	187.00	78.03
OSR	Incinerated (no energy recovery)	-	-	-	-	

Notes:

- The figure for 'Compost' is food waste sent for anaerobic digestion.
- 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.

Finite Resource Consumption

Finite resource consumption		2016/17	2017/18	2018/19	2019/20	2020/21	
Non-financial indicators ('000m ³)	Water consumption (whole site)	Supplied	97.52	62.7	97.95	92.89	98.61
		Abstracted	N/A	N/A	N/A	N/A	N/A
		Supply per FTE	0.09	0.06	0.08	0.06	0.05
	Average number FTE staff/contractors		1,046	1,130	1,249	1,461	1,818
	A4 paper reams equivalent		4,300	4,800	5,200	9,200	200
Financial indicators (£k)	Water supply costs (whole site)		165	144	279	206.3	276
	Paper supply cost		8	7	8	12	<1



Professor Ian Chapman
Chief Executive and Accounting Officer
15th July 2021

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
- confirm that the Annual Report and Accounts as a whole is fair, balanced and understandable and take personal responsibility for the Annual Report and Accounts and the judgements required for determining that it is fair, balanced and understandable.

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.

As the Accounting Officer, I have taken all the steps that I ought to have taken to make myself aware of any relevant audit information and to establish that UKAEA's auditors are aware of the information. So far as I am aware, there is no relevant audit information of which the auditors are unaware.

DIRECTORS' REPORT

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

Composition of the UKAEA Board on page 71

Disclosure of personal data-related incidents on page 92

Impact of EU Exit

The UK's transition from the European Union impacted UKAEA, as with many other organisations, in several ways including changes in business areas such as procurement and recruitment. The most significant factor affecting UKAEA in the transition from the EU has been the UK's association to Euratom. Whilst membership of the EU and Euratom are separate, Euratom membership has been of the EU member states and is governed in large part by the European Commission. The UK Government judged it legally necessary to leave Euratom at the same time as the EU. On 30th December 2020, the UK Government passed the UK-EU Joint Declaration on Participation in the Union passed into law, which allows for full participation of the UK in Euratom programmes as an associate member under equivalent conditions.

For further detail on the impact EU Exit on Programmes – see page 28

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 4th year with an opening of new facility 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 £485.5m 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 facility will cease scientific operations at the end of 2023. BEIS has confirmed that UKAEA will lead the preparation of the decommissioning programme, which enables this to be integrated with repurposing / regeneration of the JET site and to explore the opportunities for research and technical development in the first time a fusion device has been decommissioned. A business case for JET post 2023 is in development. Further information on the key achievements, deliverables and scientific campaigns for JET Operations are contained within the Performance Report on page 34.

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
15th July 2021

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, Director of Property and Corporate Services.

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

UKAEA is a non-departmental public body of the Department for Business, Energy and Industrial Strategy (BEIS) under the portfolio of the Science Minister.

FRAMEWORK AGREEMENT

The Framework Agreement between the Department for Business, Energy and Industrial Strategy (BEIS) and the UK Atomic Energy Authority (UKAEA) sets out the overall governance framework and the formal operating relationship. Following a review of the existing agreement from 2014, a new agreement was approved by Director General BEIS, Chair UKAEA and CEO UKAEA in March 2021.

It acts as a central reference point for everyone involved between BEIS and UKAEA, and supports them in making strategic, policy, and financial decisions and agreements with confidence. (See www.gov.uk/government/publications/uk-atomic-energy-authority-ukaea-framework-document)

UKAEA GROUP

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 Chief Financial Officer, Director of Property and Corporate Services 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.

On 17th April 2020, there was a change in the ownership of the private-sector partner in HSIC, Harwell Oxford Developments Limited (HOD). HOD is now owned by Brookfield Asset Management via the entity Triple Helix BidCo S.à r.l. There have been no changes to the operation of the HSIC Partnership from this change.

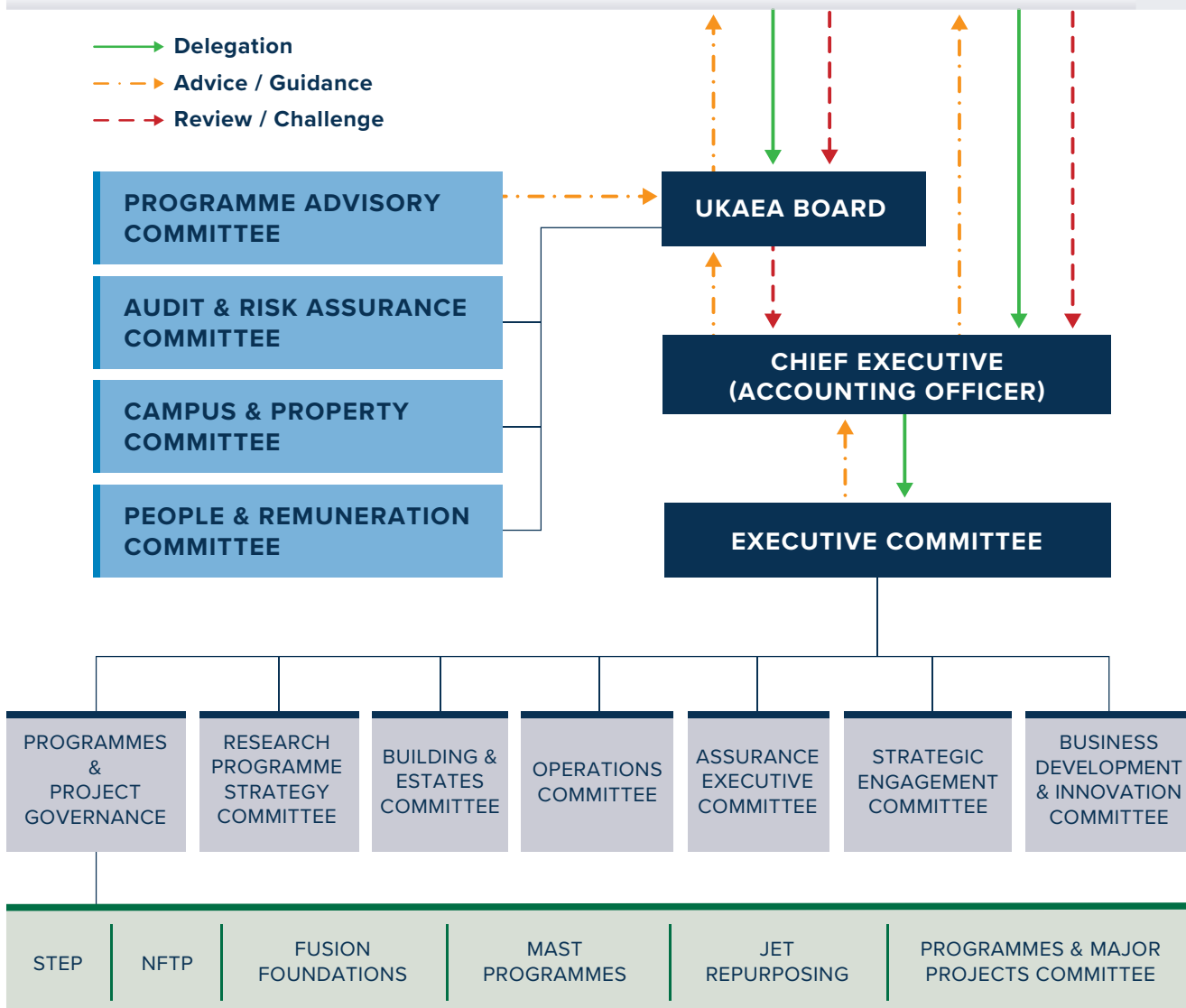
UKAEA's subsidiary, AEA Insurance Ltd, has appropriate governance arrangements in place. These are formally reviewed and updated as necessary by its Board of Directors, which includes UKAEA's Director of Finance. A compliance and company secretarial summary is tabled for review at each Board meeting. A risk register and provisions for an annual internal audit of controls and risks are also in place.

GOVERNANCE MODEL

► **MINISTERIAL OWNER: DEPARTMENT FOR BUSINESS, ENERGY & INDUSTRIAL STRATEGY**

UKAEA is an executive non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy, under the portfolio of the Science Minister

- Delegation
- Advice / Guidance
- Review / Challenge



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

The committees and governance beneath the UKAEA Board and Executive Committee support them with advice, review and guidance. Terms of reference are in place and reviewed annually, these include any delegated authority and frequency of reporting to the parent committee. The membership and purpose of the Board, Board sub-committees and the Executive Committee, are outlined in the following pages.

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.

ACCOUNTABILITY REPORT

BOARD DIVERSITY

Maintaining an appropriate balance, including a diverse range of skills, experience, knowledge and background on the Board is of paramount importance. Gender, social and ethnic diversity are significant elements of this.

Gender

Female
22%

Male
78%

Tenure in role



<1 year	40%
1 - 3 years	50%
3+ years	10%

KEY

- (A)** Audit & Risk Assurance Committee
- (C)** Campus & Property Committee
- (R)** People & Remuneration Committee
- (A)** Audit & Risk Assurance Committee Chair
- (C)** Campus & Property Committee Chair
- (R)** People & Remuneration Committee Chair



Professor David Gann CBE
Chair

- ▶ Strategy
- ▶ Leadership
- ▶ Innovation
- ▶ Governance

Experience:

David has Chaired the UKAEA Board since 1 August 2018. He is also Pro-Vice-Chancellor, Development and External Affairs, The University of Oxford, Professor of Innovation and Entrepreneurship at Saïd Business School, and Fellow, Magdalen College. David's business and academic work focuses on new technology, innovation strategy and entrepreneurship. He recently held posts on Boards with the UK's Ministry of Defence and Department of Health & Social Care.

External appointments:

David is a Non-Executive Director of Directa Plus plc, a leading producer of pristine graphene, Vencap International plc, a leading venture fund-of-funds and Aiglon College, Switzerland. He is a member of UK Government Innovation Expert Group and the London Symphony Orchestra Advisory Council.

(R)



Shrinivas Honap
Non-Executive

- ▶ Risk Management
- ▶ Finance
- ▶ Transformation
- ▶ Advance use of technology

Experience:

Shrinivas is a Chartered Accountant by profession and currently chair of our Audit Risk & Assurance Committee. He has previously held senior roles with Vodafone and Capita. He brings with him experience focused on systems development, regulation, risk and finance and has a particular interest in transformation and diversity.

External appointments:

Shrin is currently Chair at the DVSA and a Non-Executive and Chair of ARAC at: Office of the Public Guardian, LLWR, Rural Payments Agency. He is a Board member at the Civil Service Pensions Board. He has panel membership of the CMA and Pensions Determinations Body and is a lay member of the Speakers Committee on IPSA.

(R) (A)



Lady Eithne Birt
Non-Executive (from May 2020)

- ▶ Governance
- ▶ Transformation
- ▶ Strategy
- ▶ Government Relations

Experience:

Eithne was the founding Director General of the National Probation Service in 2000, building on 21 years' experience as a practitioner and senior manager. She was made a Companion of the Bath in 2004 in recognition of her public service achievements. She was appointed Managing Director of Fujitsu's UK Government Business 2005-2011.

External appointments:

Eithne was co-founder of Bluelight Global Solutions, an intelligent security solutions provider in 2014 and has been its Chair since. She became a Patron of The Topsy Foundation UK in 2016, a charity provider of services to children in South Africa.

(R)

ACCOUNTABILITY REPORT



Dr Mark Bayley CBE
Non-Executive (from May 2020)

- ▶ Finance
- ▶ Large project delivery
- ▶ Leadership

Experience:

Mark has spent much of his career in the delivery of large and complex projects at the interface between the private and public sectors. He was CFO then CEO of LCR, the developer of the High Speed 1 railway. Mark also held senior roles at HS2 and in MOD procurement.

External appointments:

Mark is a Non-Executive Director of Network Rail, Non-Executive member of the Department for Transport Audit, Risk and Assurance Committee and the Board of the Water Services Regulation Authority (Ofwat) and Chair of the Board of Trustees at the Shadwell Opera.



Stephen Barter
Non-Executive (from May 2020)

- ▶ Leadership
- ▶ Strategic overview
- ▶ Governance
- ▶ Property Development & Funding

Experience:

Stephen has over 40 years' experience in real estate, holding senior leadership roles with an international property company (Grosvenor), a sovereign wealth fund (QIA), an international real estate consultant (CBRE) and a Big Four accounting firm (KPMG). He is a Chartered Surveyor. He now has a portfolio career as Board Chair, Non-Executive Director, Trustee and Advisory Board Member.

External appointments:

Stephen is Non-Executive Chair of Mailbox REIT PLC and Thomas's London Day Schools; a Non-Executive Director of Cambridge University Property Board and H3 TradeCo (formerly Nexus Group). He is Chair of the West Midlands Public Land Task Force and a member of the London Symphony Orchestra Advisory Council, among other advisory appointments.



Professor Sir Adrian Smith, FRS
Non-Executive

- ▶ Digital research infrastructure
- ▶ Governance
- ▶ Leadership

Experience:

Sir Adrian is a distinguished statistician. He undertook an inquiry into Post-14 Mathematics Education for the UK Secretary of State for Education and Skills. In 2017, he published a 16-18 Maths Review and in 2006 he completed a report for the UK Home Secretary on the issue of public trust in Crime Statistics.

External appointments:

Adrian is the Institute Director and Chief Executive of the Alan Turing Institute. He is also President of the Royal Society, a member of the government's AI Council and Chair of the Board of the Diamond Synchrotron.



Dr Luc Bardin
Non-Executive (from May 2020)

- ▶ Global business leadership
- ▶ Strategic Partnering & Alliances
- ▶ Transformational value

Experience:

Luc has over 35 years' experience in leading global organisations in complex areas of B2B, B2G, FMCG and retail, notably as past member of BP plc's Downstream Executive Committee and CEO of multiple businesses. In 2014, he founded Strategic Partnering Ltd to help organisations break through the limitations of vertical silos and build for transformational and strategic value opportunities, notably towards net-zero. He has authored several published scholarly articles and books on Strategic Partnering.

External appointments:

He is Executive Advisor to the UK Cabinet Office, sits on HMG's Crown Representatives Board, is Advisor to the Board of Guy's & St Thomas NHS Foundation Trust and Corporate Advisor to the Toyota Motor Corporation. Luc is Chair at Strategic Partnering Ltd.



ACCOUNTABILITY REPORT



Professor Ian Chapman
Executive

- ▶ Research and Innovation
- ▶ Leadership
- ▶ International collaboration
- ▶ Government relations

Experience:

Ian Chapman became CEO of the UK Atomic Energy Authority in October 2016. As CEO he has overseen a major growth in the organisation, including the genesis of several major Government programmes, to deliver UKAEA's ambitious mission and strategy. Ian is a fusion physicist whose primary research interests are in understanding and controlling macroscopic instabilities in fusion plasmas, with over 200 journal papers published and a number of international awards.

External appointments:

Ian is a Member of Princeton Plasma Physics Advisory Board, a Member of Chinese Academy of Sciences Plasma Physics Advisory Board, the Chair of IAEA International Fusion Research Committee, a Board member for Guernsey Electric Ltd and the Clean Energy Advisory to Temasek International.



Antonia Jenkinson
Executive

- ▶ Corporate finance
- ▶ Organisation leadership & growth
- ▶ Collaborations and contracts

Experience:

Antonia was previously CFO at Roc Technologies Ltd, Satellite Applications Catapult Ltd and the Wyevale Group. Antonia has a background in private equity and corporate Finance. She won the Sunday Times NED Award/private equity backed business in 2015. Antonia is a Chartered Fellow of the Institute for Securities & Investment (FCSI) and a Chartered Certified Accountant (ACCA). Antonia is the Authority Secretary.

External appointments:

Antonia is currently a Non-Executive Director at Tekfor Global Holdings Ltd, a KKR investee company.



Chris Theobald
Non-Executive (Retired)

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.



Sue Scane
Non-Executive (Retired)

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.



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)
Shrinivas Honap		Antonia Jenkinson	Chief Financial Officer & Director of Corporate Affairs
Professor Sir Adrian Smith, FRS			
Chris Theobald	to 20 Feb 2021		
Sue Scane	to 31 Mar 2021		
Dr Luc Bardin	From 20 May 2020	Board Attendee	
Stephen Barter	From 20 May 2020	Tim Bestwick	Chief Technology Officer
Dr Mark Bayley	From 20 May 2020	Lyanne Maclean, MBE	Chief Operating Officer
Lady Eithne Birt	From 20 May 2020	BEIS	Representative from Sponsoring Department
		Norman Harrison	Independent Board Advisor
		Kay Church	Trainee Board Member (Mentee)

At the beginning of the financial year the Board comprised the Chair, two Executive Directors and four independent Non-Executive Directors, with a previous independent Non-Executive Director retained as a Board Advisor. Four new independent Non-Executive Directors joined the Board in May 2020 and during the year two existing Non-Executive Directors retired as they reached the end of their term of office. 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 are included on pages 71 to 73.

ACCOUNTABILITY REPORT

Attendance

Non-Executive Director			Executive Director		
Professor David Gann, CBE	5 (5)	Chair	Professor Ian Chapman	5 (5)	Chief Executive Officer (Accounting Officer)
Shrinivas Honap	5 (5)		Antonia Jenkinson	5 (5)	Chief Financial Officer, Director of Property & Corporate Services
Professor Sir Adrian Smith, FRS	4 (5)				
Chris Theobald	4 (4)				
Sue Scane	5 (5)				
Dr Luc Bardin	5 (5)				
Stephen Barter	5 (5)				
Dr Mark Bayley	5 (5)				
Lady Eithne Birt	5 (5)				
			Board Attendee		
			Tim Bestwick	5 (5)	Chief Technology Officer
			Lyanne Maclean, MBE	5 (5)	Chief Operating Officer
			BEIS	5 (5)	Representative from Sponsoring Department
			Norman Harrison	5 (5)	Independent Board Advisor
			Kay Church	5 (5)	Trainee Board Member (Mentee)

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.

Evaluation of Board Performance

In the summer of 2020, the UKAEA Board held an Effectiveness Review of the preceding year, independently administered with support from the Board secretary and Chair. The review recognised that, during the period under review, UKAEA had grown in depth, breadth and size, its mission was extended with new funding and it had increased capabilities in its executive leadership team. Two additional requirements occupied significant leadership time in the period: negotiations over the UKAEA's international relationships and funding after the transition from the EU, and the need to ensure staff are able to work safely through the COVID-19 pandemic. At the same time, the Board underwent a significant period of transformation with two members finishing and four new members joining.

The Board Effectiveness Review was conducted in three parts:

- Interviews:** Conducted by the independent Board Advisor, held with Board members and attendees, Executive non-Board members, and other external parties, totalling 23 interviews carried out.
- Questionnaires:** Questionnaires issued for Board and Sub-Committee activities to members and attendees, and results analysed.
- Desk-based analysis:** including analysis of Board membership and expertise, attendance and actions status in 2019/20.

BOARD REPORT

The review findings were that the present Board and its sub-committees are performing well, with a number of identified strengths, and that governance responsibilities are being discharged effectively.

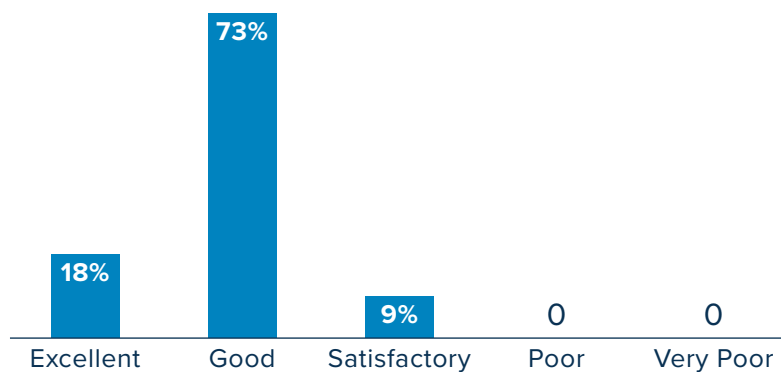
Particular strengths of the Board highlighted in the effectiveness review were: Clarity of the role of individual Board members; a highly effective Audit Committee; strong and constructive relationships with the Executive; an effective skills mix providing diversity of view; effective secretariat and support functions.

The COVID-19 pandemic was highlighted as a particular challenge, making the introduction of four new Board members to the Board challenging, particularly for an organisation with a technically detailed portfolio.

Sixteen recommendations were made to enhance the Board's effectiveness, with an action plan to enact their implementation. Priority recommendations include: Enhanced utilisation of Non-Executive Board member expertise outside of Board meetings; enhanced review of Equality, Diversity, and Inclusivity; enhanced interaction of the Board and its sub-committees to drive strategic alignment; the integration of aspects of the Board Assurance Committee into the Audit Committee; and, a broadened focus on programmatic areas.

Results of Board Effectiveness Questionnaires

Overall Board Performance



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 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.

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 Practice April 2017.



Bath undergraduate on a placement at Culham Science Centre

UKAEA EXECUTIVE COMMITTEE



UKAEA Executive Committee meeting on site for Directors Strategy Meeting

Members of the Executive Committee attending a meeting on site in June 2021 (from left to right : Nick Walkden, Stephen Wheeler, Tim Bestwick, Antonia Jenkinson, Amanda Quadling, Andrew Kirk, Ian Chapman, Lyanne Maclean, Liz Haynes, Alli Brown and Paul Methven). Note: Kay Nicholson, Rob Buckingham, Joe Milnes and William Morris were not attending the meeting shown.

The Executive Committee underwent a significant refresh of membership in 2020/21 with new Directors Amanda Quadling, Paul Methven, Steve Wheeler, and Andrew Kirk completing the senior leadership team and joining the membership; the retirement of Colin Walters; Chris Waldon stepping down from membership as the new STEP Director, Paul Methven, began his tenure; Howard Wilson and Gill Lay leaving the organisation; and Liz Haynes joining recently as UKAEA’s Director of People. Biographies of all current and former Executive Committee members in the year are included in the following pages. As at 31st March 2021, the Executive Committee was proportionally 43% female and 57% male, with tenures at UKAEA as outlined in the figure below:

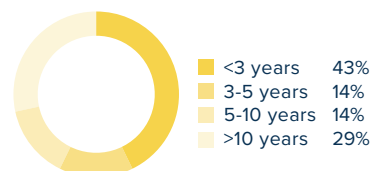
EXECUTIVE COMMITTEE DIVERSITY

Gender

Female
43%

Male
57%

Tenure in role



ACCOUNTABILITY REPORT

Professor Ian Chapman

Chief Executive Officer and Accounting Officer

Experience:

See page 73 for Ian Chapman's bio.

Antonia Jenkinson

Chief Financial Officer,
Director of Property & Corporate Services

Experience:

See page 73 for Antonia Jenkinson's bio.

Dr Tim Bestwick

Chief Technical Officer & Director of Strategy,
Communications and Business Development

- ▶ Technology start-up companies
- ▶ Development & commercialisation of technology
- ▶ Intellectual property

Experience:

Tim joined UKAEA in 2018, to lead innovation and commercialisation at UKAEA, and develop the UK Fusion cluster. Before coming to UKAEA, Tim led commercialisation and innovation at the Science and Technology Facilities Council. This included the major research and innovation campuses at Harwell and Daresbury and starting a number of successful new companies. Tim is also a past Chair of Eureka, the world's largest public network for R&D and innovation, and has worked for start-up companies, Sharp Corporation and IBM Research in the US.

External appointments:

Director, Harwell Science & Innovation Campus

Lyanne Maclean

Chief Operating Officer

- ▶ Leadership
- ▶ Operational & site safety

Experience:

Lyanne joined UKAEA in June 2019. She has held a variety of senior planning and policy roles in the MoD, NATO and the UN, Joint and Army HQs. As a British Army Officer, she left as a Colonel. 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.

Professor Rob Buckingham

Director of RACE

- ▶ Robotics
- ▶ Change & Innovation

Rob is the first Head of RACE, the UKAEA's centre for Remote Applications in Challenging Environments. He was lead author of the UK's Robotics and Autonomous Systems 2020 Strategy (2014, 2020 update). Before joining the UKAEA, Rob co-founded and was Managing Director of OC Robotics which developed and commercialised snake-arm™ robots. He is a Fellow of the Royal Academy of Engineering and a Fellow of the Institute of Engineering and Technology. Rob received an OBE for services to robotics engineering in the 2021 New Year Honours.

External appointments:

LuffyAI – Non-Executive Director on the Board
UK Robotics Growth Partnership

Alli Brown

Director of Finance and Business Systems

- ▶ Business Systems and Assurance
- ▶ Finance Operations and Shared Services
- ▶ Business Planning

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.

External appointments:

UKAEA appointed Board member for AEAIL, a subsidiary captive insurance company. Trainee Board Member of the UK Space Agency Steering Board and Audit & Risk Assurance Committee.

ACCOUNTABILITY REPORT

Liz Haynes

Head of People

- ▶ People strategy
- ▶ Organisation development and design
- ▶ Employee engagement

Experience:

Liz joined UKAEA in June 2021. She is a Chartered Fellow of the Chartered Institute of Personnel and Development. Liz's career spans the private and public sectors, including roles in the Civil Service with Border Force, BEIS and the Cabinet Office, where she delivered a number of major ministerial programmes. Her role at UKAEA encompasses all aspects of the People Function and she is motivated by enabling individuals and organisations to thrive.

External appointments:

Liz is a trustee of Seb's Foundation, a charity providing academic and sporting opportunities for young people from socially disadvantaged backgrounds.

Dr Andrew Kirk

Director of Tokamak Science and MAST-U Operations

- ▶ Commissioning of Tokamak fusion devices
- ▶ Fusion plasma physics
- ▶ Science programme management

Experience:

Appointed Director of Tokamak Science and MAST Upgrade 1 July 2020. Andrew joined UKAEA in 2000 after spending 15 years working at CERN. He has led the Tokamak Science programme since 2016 and the MAST-U programme since 2014.

External appointments:

Member of the NSTX-U Programme Advisory Board.

Dr Joe Milnes

JET Operating Contract Senior Manager

- ▶ Project Delivery
- ▶ Operations
- ▶ Technical Leadership

Joe joined UKAEA in 2000. His background is in engineering and he has a PhD in thermal-hydraulic modelling. Joe has held a variety of engineering and management roles across JET, MAST-U and ITER. As well as leading operations on JET, he also chairs and advises reviews of fusion facilities worldwide.

Dr William Morris

Chief Scientist

- ▶ Fusion Science and technology
- ▶ Technical and scientific leadership
- ▶ Research governance and assurance

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.

ACCOUNTABILITY REPORT

Kay Nicholson

Head of Assurance

- ▶ Governance
- ▶ Assurance
- ▶ Enterprise Risk Management

Experience:

Kay joined UKAEA in 2014 and is a Fellow of the Institute of Risk and Safety Management and chartered member of the Institute of Occupational Safety and Health. She has worked in a range of manufacturing industries, notably the Maritime Defence sector in the UK and internationally, as well as the automotive industry. Kay has led on cultural change programmes with particular emphasis on improving assurance processes.

External appointments:

Kay is the UKAEA appointed Board member of RADS SAFE CLG.

Amanda Quadling

Director of Materials

- ▶ Collaborative R&D
- ▶ Laboratory Operations
- ▶ Science innovation

Experience:

Amanda is a mineralogist with a PhD in Materials Science and Engineering. She has spent the last twenty years creating and managing laboratories, incubators, commercial service divisions and Centres of Excellence focused on products and services in the energy sector and head industry. She was previously on the Technology Advisory Board of global corporate Morgan Advanced Materials and Technical Director for UK manufacturer M&I Materials (tungsten, dielectrics, electroceramics). In 2019, Amanda was named 10th most influential women in UK engineering 2019 (Financial Times). She is now UKAEA's Director of Materials, and together with the Royce Institute, is focused on a Fusion Materials Roadmap for the UK.

External appointments:

Amanda was previously a Board member for the British Ceramic Confederation. She currently represents UKAEA on the Governing Board of The Henry Royce Institute (for Materials).

Paul Methven

STEP Programme Director

- ▶ Major Programme Leadership
- ▶ Governance
- ▶ Strategic Partnering and large-scale commercial relationships

Paul joined UKAEA September 2020 from the Ministry of Defence, where he was Director of Submarine Acquisition at the Submarine Delivery Agency. In this role he was Programme Director for Dreadnought and has previously led a number of other complex major programmes across the MoD.

Stephen Wheeler

Director of Fusion Technology

- ▶ Operations Management
- ▶ Project Governance
- ▶ Leadership
- ▶ Operational Growth

Stephen joined UKAEA in 2015 following a career in industry first in engineering design and later managing advanced production facilities in Europe and North America. He successfully established the RACE business unit operation and over five years delivered five-fold growth. In April 2020 he was appointed Director of Fusion Technology.

Secretariat - Dr Nick Walkden

Head of the Executive Office

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. In 2019 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 is secretary for Board and Executive meetings.

External appointments:

Member of the Fusion Centre for Doctoral Training External Advisory Board

ACCOUNTABILITY REPORT**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.

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.

Chris Waldon

STEP Delivery Director (to September 2020)

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. Chris retired his membership of the Executive Committee in September 2020 following the appointment of the STEP Director and continues his role as STEP Delivery Director.

Gill Lay

Head of People (to March 2021)

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. Gill retired her membership from the Executive Committee in March 2021.

ACCOUNTABILITY REPORT

UKAEA EXECUTIVE COMMITTEE HOLD A SOCIALLY DISTANCED MEETING IN MAY 2021



EXECUTIVE COMMITTEE REPORT

Overview and key duties

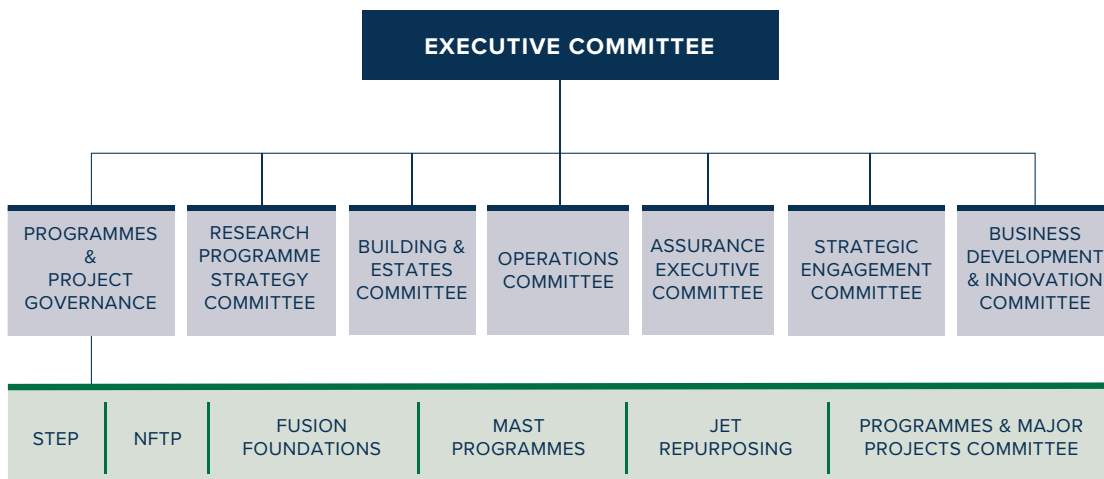
Meeting 12 times this year, our Executive Committee delivers the strategic direction of our business on behalf of the Board. It brings together all aspects of our business and seeks to embed our delivery culture at the highest level of our decision-making. The Executive Committee analyses material issues 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 2021/22 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, customers, 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 with specific Programme Boards for major programmes and project governance.

- **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.
- **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
- **Building & Estates Committee** is responsible for the investment in, and management of, property assets and proposing property strategy to the Executive Committee
- **Assurance Executive 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.
- **Strategic Engagement Committee** established in November 2020 consists of a diverse cross-section of early and mid-career employees with strategic acumen, and is responsible for providing a diverse view to the Executive Committee on topics of strategic importance to the organisation as well as developing its members in an Executive sub-committee setting.



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

BOARD COMMITTEE REPORTS

PEOPLE & REMUNERATION COMMITTEE

Overview

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.

In May 2021, in line with agreed actions from the Board Effectiveness Review, the remit of the Remuneration Committee was extended to endorse UKAEA's People and Equality, Inclusivity, and Diversity (EDI) strategies and offer advice on major proposed changes to pay and remuneration arrangements or terms and conditions of UKAEA staff which would require the agreement of Government. To drive the efficacy of UKAEA's Inclusion Council, the Chair of the Remuneration Committee chairs the Council.

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

Composition of the People and Remuneration Committee

The Remuneration Committee met five times during the year. All its members are independent Non-Executive Directors. Where necessary, non-committee members are invited to attend. Professor David Gann chaired the committee in May 2020 and was succeeded in this role in July 2020. Lady Eithne Birt chaired the committee from July 2020 onwards to present. Also, in July 2020, Dr Luc Bardin joined the committee membership, whilst Chris Theobald left the committee in February 2021 following the end of his membership to the Board as a Non-Executive Director.

Attendance

Non-Executive Director			Executive Directors		
Lady Eithne Birt	4 (4)	Chair from July 2020	Sue Scane	4 (5)	to 31 Mar 2021
David Gann	5 (5)	Chair in May 2020	Chris Theobald	4 (4)	to 20 Feb 2021
Luc Bardin	3 (4)	from 20 May 2020	Secretary		
Shrin Honap	4 (5)		Gill Lay	5 (5)	Director of People - to 31 Mar 2021
Adrian Smith	5 (5)				

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

- Provision of assurance and advice to the Accounting Officer regarding the effectiveness of the control environment and appropriate mitigation if needed
- Reviewing and where appropriate providing advice to the Board on its risk appetite
- Making a recommendation of appointment of external auditors and assessing their performance on an ongoing basis
- Assessing the quality of Internal Audit and other assurance functions to measure their efficacy and remediate where appropriate
- Reviewing and approving the assurance program to assess whether, on an ongoing basis, the program addresses the risks the organisation is subject to. This includes both the internal and external programs of work
- Reviewing periodic risk assurance reports from the Executive and provision of advice to same where weaknesses are observed
- Reviewing the annual financial statements in terms of assurance gained regarding compliance with good practice and recommend to the Board
- Reviewing effectiveness of arrangements to prevent fraud
- Reviewing all recommendations made by assurance functions (internal and external) and management responses
- Undertaking a periodic review of the work of ARAC
- Acting as primary stakeholder in respect of the Whistleblowing/Raising a Concern Policy and
- Bringing any matter to the attention of the Independent Chair of UKAEA or Board as required.

ACCOUNTABILITY REPORT

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

- Oversight and approval of Senior Team objectives and related performance related pay.
- Reviews UKAEA's executive remuneration policy in relation to its competitors and industry norms and contract periods.
- Advise to the CEO and Board on succession plans for the Executive Team.

Extended during the year to include:

- Oversight of People Strategy including offering advice on the approach to any major pay, remuneration and Terms and Conditions changes which require Government approval.
- Oversight of the Equality, Diversity and Inclusion Strategy and the effectiveness of the Inclusion Council.
- Provide Assurance to the Board and CEO on these Undertaking a periodic review of the work of People and Remuneration Committee.

Key areas considered by the People and Remuneration Committee during the year were:

- Executive remuneration in the period based on judgement on the achievement of objectives and UKAEA performance.
- Approving Executive objectives for the coming year.
- Extension of scope and proposed TORs for Board approval.

CHAIR'S REPORT



Lady Eithne Birt

"This was a year where members fulfilled their governance role around oversight and approval of the Senior Executive Team's objectives and the subsequent determination of bonus payments to individuals on the basis of performance. Payments reflected the commitment, industry, and high delivery achievements of this team.

However, after time spent by the UKAEA Board developing strategy and reviewing the performance of the Board itself and its sub-committees, a decision was taken to extend the brief of the group beyond the more traditional remuneration only to the organisation's chief assets - its people. New Terms of Reference were set in place and the name was changed to 'People and Remuneration Committee'. It will now take into its remit, oversight of a thorough ongoing UKAEA People Strategy – and work with the Executive team to drive a greater focus and emphasis on inclusion, increasing engagement and efficacy of the Inclusion Council."

CAMPUS & PROPERTY COMMITTEE REPORT

Overview

The Committee was established in May 2020 by UKAEA Board, in recognition of the increasing significance and growth of campus development and other property activities for the organisation, and in order to support the delivery of financial and commercial returns from property consistent with the Corporate Plan. The principal responsibility is to advise the Board on strategic property matters and to provide guidance to the Executive Team.

Composition of the Campus & Property Committee

The Campus & Property Committee met four times during the year. Its ongoing membership, following Sue Scane leaving her tenure at 31 March 2021, consists of two independent Non-Executive Directors and three UKAEA executive members. The independent Non-Executives are Stephen Barter (as Chair) and Mark Bayley, see pages 71 to 73 for their biographies. The UKAEA executive members are the Chief Financial Officer & Director of Property and Corporate Services (CFO), the Chief Technology Officer (CTO) and the Head of Campus Development.

The scope of the committee comprises property relating to the UKAEA Group. In addition to UKAEA's directly managed property interests at Culham and on other sites within the UK, it also controls 50% of the public sector partnership (Public Sector Limited Partnership, HSIC PubSP) which controls 50% of the Harwell Science and Innovation Campus Ltd Partnership (HSIC). The CTO is on the Boards of both HSIC PubSP and HSIC. The CFO is on the Board of HSIC PubSP.

Where necessary, non-committee members are invited to attend.

Attendance

Non-Executive Director			Committee Attendee		
Stephen Barter	4 (4)	Chair from July 2020	Tim Bestwick	4 (4)	Chief Technology Officer
Dr Mark Bayley	4 (4)	Chair in May 2020	Caroline Livingstone	3 (4)	Head of Campus Development
Sue Scane	4 (4)	from 20 May 2020	Steven Moss	3 (4)	Property Advisor
Executive Director			Secretary		
Antonia Jenkinson	4 (4)	Chief Financial Officer, Director of Property & Corporate Services	Silvia Rapa	3 (4)	Environment Advisor

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

- Reviewing campus development and other property project proposals ahead of consideration by the UKAEA Board
- Providing strategic advice and guidance to the Executive Team
- Regularly reviewing the governance, management, funding and risk of the UKAEA estate in order to achieve the overall corporate objectives, including the delivery of financial and commercial returns from property consistent with the corporate plan
- Reporting on its activities to the UKAEA Board
- Undertaking a periodic review of the work of the Campus and Property Committee

Key areas considered by the Campus and Property Committee during the year were:

- Property objectives at UKAEA
- Progression of the masterplan at Culham, and particularly the beneficial consequences expected to follow from the removal of the whole site from Green Belt and the construction of a major new link road to the site
- Progress of the Harwell Joint Venture, including the new business plan following the introduction of Brookfield as the new Joint Venture partner in place of U+I
- Review of material construction projects, including the call for sites for the new STEP facility
- Review of commercial arrangements for significant new facilities, including new commercial buildings at Culham for 3rd party occupation
- Review of property valuations

CHAIR'S REPORT



Stephen Barter

"The strategic importance of campus development to creating a successful 'knowledge cluster' around the activities of UKAEA, and the furtherance of the UK Government's wider 'big science' agenda at Harwell, help to explain the creation of this new Board Committee to support the work of the Executive Team. The Committee has already been actively engaged in considering a number of new development projects and in progressing a strategic approach to the further master planning and asset management of the Harwell and Culham campuses. It is also taking an active interest in UKAEA's new campuses, both in Rotherham and potentially for STEP.

Our focus for the coming year will be to support and provide guidance to the Executive Team in the forward planning and commercial structuring of priority development projects, and the ongoing management of the estate to achieve the objectives of the Corporate Plan."

BOARD ASSURANCE COMMITTEE REPORT

Following the Board Effectiveness Review in quarter 2 (July to September 2020) it was concluded that as part of committee restructuring, the main elements of the Board Assurance Committee terms of reference would be re-allocated to other governance/oversight arrangements. To this end, BAC was discontinued after the meeting in November 2020. This report covers the period until then, during which the Board Assurance Committee met 3 times.

As part of this restructuring, the Audit Committee has transitioned to the Audit and Risk Assurance Committee and now encompasses a wider scope to include Risk Management oversight (previously reported directly to the Board) in order to provide an overall opinion on the effectiveness of management controls.

An Executive Assurance committee, responsible for co-ordinating assurance activities, enterprise risk oversight, information security and facilitation of other third line of defence activities, has been established reporting directly to the CEO and onwards to Audit & Risk Assurance Committee.

Safety, health, environment, quality and security reports directly to the COO and onwards to the UKAEA Board.

Responsibility for the scientific quality, quality processes and Good Scientific Practice Governance have been allocated to the Research Programme Strategy Committee (RPSC), to be overseen by the Chief Scientist with future consideration of other options via external research review bodies. RPSC reports directly to the Executive Committee.

Composition and Terms of Reference of the Board Assurance Committee

The chair of the Board Assurance Committee was Chris Theobald, Non-Executive Director. The COO and Head of Assurance were in attendance representing senior management along with two independent committee members, the lead safety representative and members from Safety, Health, Environment and Quality team (SHEQ) also attended. The Committee met virtually three times during the year and due to the focus and commitment of resources on COVID-19 the attendance of a department manager on rotation and the Senior Information Risk Owner was not required.

The committee was 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.

ACCOUNTABILITY REPORT

Attendance

Non-Executive Director			Committee Attendee		
Chris Theobald	3 (3)	Chair	Matt Green	2 (2)	Head of SHEQ
			Sam Jackson	3 (3)	SHE Group Leader
			Julian Lewis	2 (3)	Lead Safety Representative
Executive Director					
Antonia Jenkinson	0 (2)	CFO & Senior Information Risk Owner (SIRO)	Lyanne Maclean	3 (3)	Chief Operating Officer
			Kay Nicholson	3 (3)	Head of Assurance
Independent Board Advisor					
Alan Kaye	3 (3)	Advisor	Department Manager	0 (2)	(on rotation)
Jim MacHardy	3 (3)	Advisor	Secretary		
			Adrian Foster	3 (3)	Emergency Planning Advisor

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:

- A particular focus at the meetings was to receive briefings on UKAEA's COVID-19 policy approach and the arrangements put in place enabling critical site operations to resume whilst maintaining workforce safety. Management of the risk from COVID-19 has required significant commitment of resource and time to ensure the site remains COVID-19 secure. A robust set of controls were implemented which included minimising those who need to return to site, separating the Culham site into zones with each zone subject to Area Management Plans and controlled by appointed Wardens, implementing controls inside and outside of buildings in line with Government guidance and investigation of all COVID-19 symptom reports. Planning continues for a rapid return to full site occupancy but with potentially different ways of working and how our site operates after the crisis passes.
- Preparations for tritium operations: regular update 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 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. Ongoing oversight of DT operations is now allocated to the Site Safety Working Party.
- Scientific quality: as part of its remit to assure that UKAEA's scientific reputation is maintained, the committee had requested the development of additional quantitative measures of science quality and received the first edition of a new Research Quality dashboard which will monitor the quality of our science and the risks affecting it so that action is taken when necessary. Five broad measures have been developed which represent the pipeline of achieving scientific excellence from recruiting and growing staff, publishing, establishing a world-class profile, and ultimately securing continued or new funding. The committee welcomed the new dashboard which will provide evidence of UKAEA's scientific quality based using recognised measures, and that oversight of Good Scientific Practice Governance is now allocated to the Research Programme Strategy Committee.
- Business Resilience: updates were provided on progress with the strategy to adapt the Business Continuity Management (BCM) framework to UKAEA's current needs and highlighted the key points on the further work planned to increase the BCM competency and maturity within UKAEA.

AUDIT & RISK ASSURANCE COMMITTEE

Overview

The Audit & Risk Assurance Committee was formed in the year and represents a combination of the Board Assurance Committee and Audit Committee.

The Audit & Risk Assurance Committee met four times during the year. All its members are independent Non-Executive Directors and includes operational leaders. The Committee is chaired by a Non-Executive Director, Shrinivas Honap.

The Committee plays a crucial role in oversight and scrutiny of our internal control environment, financial reporting and approach to risk. In 2020/21, four Non-Executive Directors were members of the Audit & Risk Assurance Committee, with one member ending their appointment in February 2021. The committee welcomed a new Non-Executive Director, Luc Bardin (see biographies on pages 71 to 73) in May 2021.

The Committee's responsibilities include assuring the Board and the Accounting Officer 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. ARAC independently review the comprehensiveness and reliability of assurances on governance, risk management, the control environment and the integrity of the financial statements and the annual report.

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.

Composition of the Audit & Risk Assurance Committee

For the year to 31st March 2021, the Committee had at least one member possessing what the Smith Report and HMT's Audit & Risk Assurance 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 & Risk Assurance across government having previously been an executive at Vodafone and Capita Plc.

The Audit & Risk Assurance 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 & Risk Assurance 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.

Department for Business, Energy & Strategy (BEIS): representatives of BEIS as sponsoring body.

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 & Risk Assurance Committee Chair meets with the Head of Internal Audit on a regular basis.

ACCOUNTABILITY REPORT

Attendance

Non-Executive Director			Committee Attendee		
Shrinivas Honap	4 (4)	Chair	Allison Brown	4 (4)	Director of Finance & Business Systems
Sue Scane	4 (4)	to 31 Mar 2021	Stuart Biltcliffe	4 (4)	Head of Financial Accounts
Professor Sir Adrian Smith, FRS	3 (4)		Sarah Laws	4 (4)	Head of Internal Audit
Chris Theobald	3 (3)	to 20 Feb 2021	Kay Nicholson	3 (4)	Head of Assurance
Executive Director			Secretary		
Professor Ian Chapman	4 (4)	Chief Executive Officer (Accounting Officer)	BEIS	4 (4)	Representative from Sponsoring Dept
Antonia Jenkinson	4 (4)	Chief Financial Officer, Director of Property & Corporate Services	NAO	4 (4)	NAO representative
Independent Board Advisor			Lesley Hotchin	4 (4)	Bid & Governance Accountant
Norman Harrison	0(0)	Advisor			

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

- Provision of assurance and advice to the Accounting Officer regarding the effectiveness of the control environment and appropriate mitigation if needed
- Reviewing and where appropriate providing advice to the Board on its risk appetite
- Making a recommendation of appointment of external auditors (where applicable) and assessing their performance on an ongoing basis
- Assessing the quality of Internal Audit and other assurance functions to measure their efficacy and remediate where appropriate
- Reviewing and approving the assurance program to assess whether, on an ongoing basis, the program addresses the risks the organisation is subject to. This includes both the internal and external programs of work
- Reviewing periodic risk assurance reports from the Executive and provision of advice to same where weaknesses are observed
- Reviewing the annual financial statements in terms of assurance gained regarding compliance with good practice and recommend to the Board
- Reviewing effectiveness of arrangements to prevent fraud
- Reviewing all recommendations made by assurance functions (internal and external) and management responses
- Undertaking a periodic review of the work of the Audit and Risk Assurance Committee
- Acting as primary stakeholder in respect of the Whistleblowing/Raising a Concern Policy and
- Bringing any matter to the attention of the Independent Chair of UKAEA or Board as required.

Key areas considered by the Audit & Risk Assurance 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.

ACCOUNTABILITY REPORT

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 earlier accreditation to Cyber Essentials, the UKAEA is now aligned with the Government's 10 Steps to Cyber Security Framework and work is ongoing to align with the Information Security Management System standard (ISO 27001). 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. The Cyber Security team has been expanded and new tools deployed to improve detection and remediation of cyber-attacks.

There have been no reportable data breaches or data loss incidents during the year.

CHAIR'S REPORT



Shrinivas Honap

"As in the previous year the Executive team continue to make significant progress in managing and mitigating risks. This progress has been more commendable given the context of the COVID-19 crisis.

The focus in the coming year needs to be

- *Improving its management of 3rd party contractors*
- *Ensuring that its asset registers reflect the requirements for safety and maintenance*
- *Continuing to enhance progress on cyber security and reducing its technical debt.*
- *Completing its work on payroll integration*
- *Consider the decommissioning and utilisation of its JET assets*

As with a number of public sector research establishments the UKAEA will face a competitive recruitment market for technical skills and research progress is dependent on securing such skills.

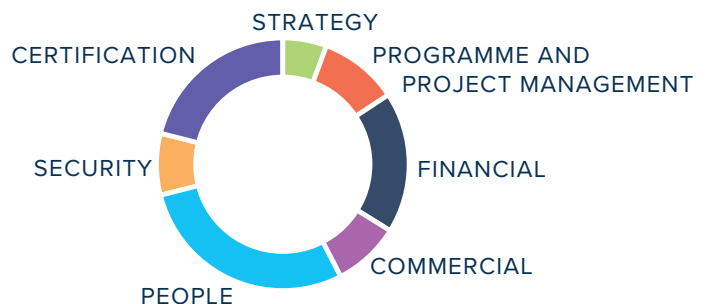
Moreover, the organisation will need to demonstrate value for money on programs which are over an extended timescale whilst retaining its world leading reputation for fusion research."

Risk Management

An integrated system of risk management is in place across the organisation, see pages 22-23 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 & Risk Assurance 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 Page 18). This programme covers the management of risks and information from across the organisation. The Head of Internal Audit provides the Audit & Risk Assurance Committee with regular updates on the programme progress.



ACCOUNTABILITY REPORT

Internal Audit Annual Opinion

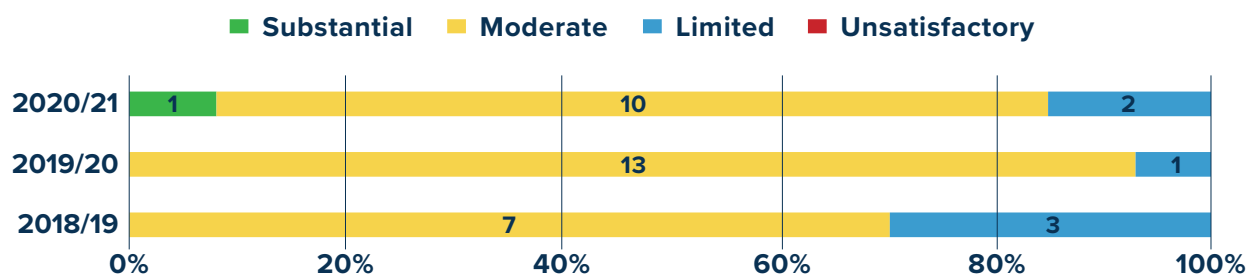
On the basis of the audit work undertaken for the year and considering all available evidence, in my opinion, I can provide moderate assurance that there is a generally sound system of internal control, governance and risk management within UKAEA. In forming this opinion, the following has been taken into account:

- All audits undertaken in the year with revised changes approved by ARAC
- Effect of the COVID-19 pandemic which did not impact planned audits or scopes and sufficient, reliable, relevant and useful audit evidence was gathered remotely to enable adequate assurance over the risk areas audited
- Closure of 85% of open and raised audit recommendations in the year
- 100% of audit recommendations accepted by management from completed audits with robust and timely action plans in place and,
- The improvement in the Cyber Security & Payroll assurance ratings from Limited to Moderate.

Audit Results

The audits which had a Limited Assurance rating are the Rullion Agency Supplied Worker Contract where action is required to document end to end process and identify risks and Unapproved Work where action is required to improve the timeliness of purchase order raising and approval and training of Contract Project Managers. These are currently being addressed by management. The Review of the Asset Management Programme which was a Moderate Assurance rating raised actions to improve communication and engagement with stakeholders which is crucial to the success of the project.

Audit Assurance Ratings



The following table summarises progress during the year on completing recommendations and actions arising from Internal Audit reviews. Of the completed actions, 78% were completed on time – with 6 of 47 remaining in progress and 1 overdue.

	No. of actions	Completed	Outstanding @ 31st March 2021	
			In Progress	Overdue
Audit actions				
Brought forward from 2017/18	1			1
Brought forward from 2018/19	1	1		
Brought forward from 2019/20	3	3		
Raised in this year	42	36	6	
Total	47	40	6	1
Carried forward			7	

ACCOUNTABILITY REPORT

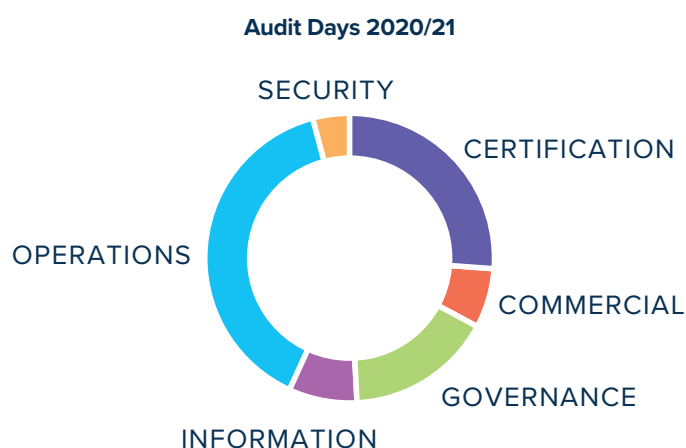
Overdue Actions

Payroll interface

The Payroll interface action has now been closed in June 2021 which recognises the improvements in checking and transmitting data to our payroll provider.

Management Systems Audit

The Management Systems audit programme 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. Management Systems Audits are included in the 3 year combined audit programme to ensure that key risks are covered, over assurance is avoided and has optimised our drive for implementation of process improvements. This was recognised as a 'Strong Point' during an external management systems certification audit in 2020. During the year, the alignment of a single audit process has been continuing with the introduction of overall assurance ratings for completed audits towards the latter part of the year.



The following table summarises progress during the year on completing recommendations and actions arising from Management Systems Audit reviews and certifications. Of the completed actions, 59% were completed on time – with 17 of 111 remaining in progress and 2 overdue.

	No. of actions	Completed	Outstanding @ 31st March 2021	
			In Progress	Overdue
Audit actions				
Brought forward from 2018/19	9	9		
Brought forward from 2019/20	24	24		
Raised in this year	78	59	17	2
Total	111	92	17	2
Carried forward			19	

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.

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 whistleblowing policy which is available to all workers. A review of this policy took place during the year and this identified some improvements and the establishment of a dedicated email whistleblowing@ukaea.uk. No whistleblowing claims were received during the year.

Conflict of Interest

UKAEA has a detailed conflict of interest policy. Board members and the Executive Committee are required to complete an annual declaration, meeting Chair’s 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. This process has been updated to include the publication of a Board Register of Interest on Gov.UK. Include Register of Interest link (if published by this point)

Alexander Tax Review

I confirm that the UKAEA is compliant with the requirements of the Alexander Review (2012). All 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 2021.

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.

ACCOUNTABILITY REPORT

Freedom of Information

As a public authority UKAEA has a legal obligation to provide information through an approved publication scheme and in response to requests. All requests must be responded to within 20 days of receipt.

Any FOI requests are directed by the staff receiving the request to be made in writing and are forwarded or sent directly to foienquiries@ukaea.uk. The email account is published on the UKAEA website which also receives FOI enquiries directly and is monitored by the FOI officers.

UKAEA follows the Information Commissioner's Office guidance. An acknowledgement is issued to each original FOI and it is aimed to acknowledge the request within 1-2 working days of receipt. Each request is tracked and responded to within a 20 working daytime frame, beginning from the first working day after the request has been received.

In the current year UKAEA received 55 FOI requests achieving 93% compliance of response within 20 days (51 of 55). Of the remaining 4, 3 advices of delay were sent, and compliant responses were issued, 1 was refused.

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.

The CTO is the Executive Lead for Knowledge Assets, following the publication of the Government draft standard in April 2021, the CTO is leading a review of UKAEA process to determine an implementation strategy.

Counter fraud

During the past year, we have continued to implement actions in line with the Government Counter Fraud Standard GovS 013. Through our relationship with GIAA, we can access Accredited Counter Fraud Specialists as required.

Better payment practice

UKAEA supports the Better Payment Practice Code in its treatment of suppliers with the aim of paying undisputed invoices as soon as possible. The key principles are to settle the terms of payment with suppliers when agreeing the transaction, to settle disputes on invoices without delay and to ensure that suppliers are made aware of the terms of payment and to abide by those terms.

During the year, UKAEA has achieved a 95% success rate for payment of suppliers in accordance with terms (2019/20 95 %). The average number of payment days from invoice date was 8.07 days (2019/20 7.10 days). These statistics are reported for all invoices received, we do not distinguish if the invoice was valid or not.

As a result of the coronavirus, COVID-19, outbreak UKAEA complied with the Procurement Policy Note (PPN) 02/2020. The PPN set out information and guidance for public bodies on payment of their suppliers to ensure service continuity during and after the outbreak.

ACCOUNTABILITY REPORT

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 and CFO as Executive Directors receive 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 2020/21 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 table below, with salaries disclosed on an accruals basis.

This part of the report is subject to audit.

ACCOUNTABILITY REPORT

2020/21	Salary/ Fees £k	Benefits ^(a) to nearest £100	Annual ^(b) bonus £k	Pension ^(c) benefit £k	2020/21 Total £k
Chair:					
David Gann	20-25	-	-	-	20-25
Non-Executive Directors:					
Shrin Honap	10-15	-	-	-	10-15
Sue Scane	10-15	-	-	-	10-15
Adrian Smith	10-15	-	-	-	10-15
Chris Theobald	10-15	-	-	-	10-15
Lady Eithne Birt (from May 2020)	10-15	-	-	-	10-15
Dr Luc Bardin (from May 2020)	10-15	-	-	-	10-15
Dr Mark Bayley (from May 2020)	10-15	-	-	-	10-15
Stephen Barter (from May 2020)	10-15	100	-	-	10-15
Executive Directors:					
Ian Chapman	175-180	-	25-30	22	225-230
Antonia Jenkinson	135-140	-	15-20	29	180-185

2019/20	Salary/ Fees £k	Benefits ^(a) to nearest £100	Annual ^(b) bonus £k	Pension ^(c) benefit £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

Notes:

- Expenses disclosed for the Chair and Non-Executive Directors in 2020/21 and in the comparatives for 2019/20 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. 2020/21 bonuses are estimated, and the actual 2019/20 bonuses awarded did not differ materially from those reported in the comparative for 2019/20.
- 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.

ACCOUNTABILITY REPORT**Remuneration ratios**

These figures are subject to audit.

	2020/21	2019/20
	£	£
Highest Paid Director's Total Remuneration	205k-210k	200k - 205k
Median Total Remuneration	45,604	44,517
Ratio	4.55	4.50

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 2020/21, No (2019/20, No) employees received remuneration in excess of the highest paid Director.

Remuneration ranged from £14,005 to £206,909 (2019/20 £13,335 to £200,489).

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 2021 and include the value of added years paid for by Directors.

	Accrued pension as at 31/3/21 £k	Lump sum as at 31/3/21 £k	Real increase in accrued pension ^(a) £k	Real increase in lump sum ^(a) £k
Ian Chapman	25	76	2	5
Antonia Jenkinson	9	27	2	5

Notes:

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

(b) Remuneration tables only include Board members for 2020/21 and 2019/20.

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 but represent a potential liability of the pension scheme or UKAEA.

	CETV at 31 March 2020 £k	Real increase in CETV ^(a) £k	CETV at 31 March 2021 £k
Executive Directors			
Ian Chapman	361	11	395
Antonia Jenkinson	143	25	183

Notes:

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

(b) Remuneration tables only include Board members for 2020/21 and 2019/20.

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 comprise:	2021 £k	2020 £k
Permanently employed staff:		
Salaries, bonuses and allowances	65,544	52,778
Social security costs	7,461	6,073
Pension costs – defined contribution plans (see below)	10,486	8,427
	83,491	67,278
Other staff	24,859	21,151
	108,350	88,429

Staff costs comprise:

Staff numbers

The average number of full-time equivalent staff during the year was as follows:	2021	2020
Directly employed	1,351	1,110
Other staff	467	351
	1,818	1,461

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 2021 (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	7	3	10
Executive Committee	8	5	13
Senior staff	11	3	14

All Employees

	2021		2020	
Male	1,144	75.9%	956	76.1%
Female	363	24.1%	300	23.9%

Sickness absence (not subject to audit)

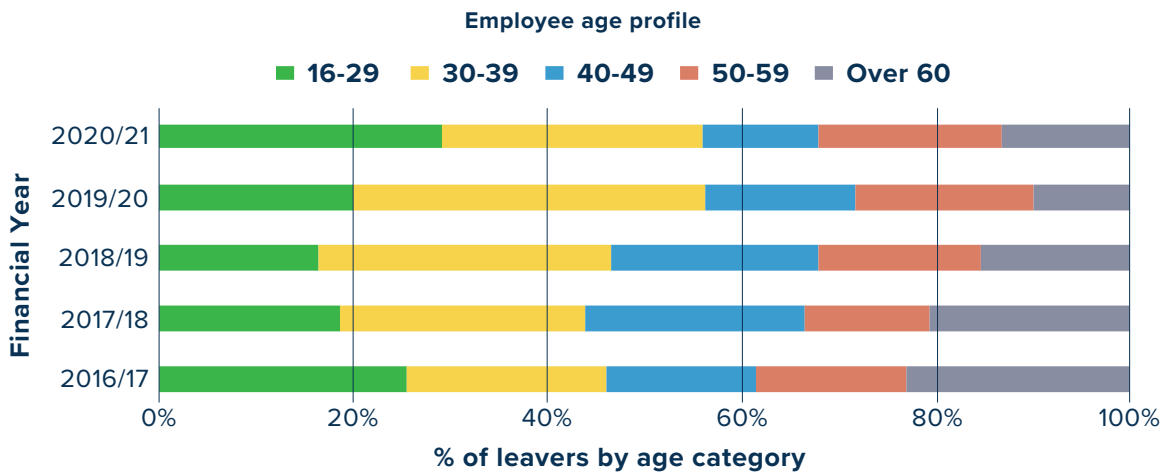
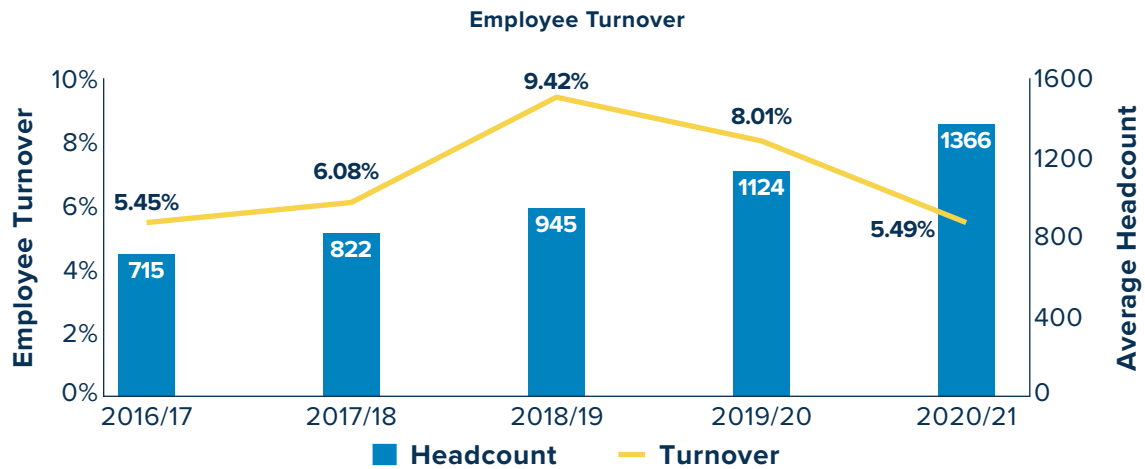
The average sickness absence per employee for UKAEA during the 2020/21 year was 4.1 days per person, compared with 6.5 days in 2019/20.

ACCOUNTABILITY REPORT

Staff Turnover

2021
5.49%

2020
8.01%



Turnover during the pandemic was lower than previous years, potentially favourably impacted by the uncertainty and lack of international mobility that has been a feature of lockdown restrictions.

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

ACCOUNTABILITY REPORT

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 £10,460k (2020: £8,402k).

(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 £26k (2020: £25k).

(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	
	2020/21	2019/20
	£k	£k
At 1 April 2020	2,218	2,106
Change in discount rate	50	231
Interest on liability	39	60
Benefits payable	(83)	(81)
Actuarial (gain) loss	(34)	(98)
At 31 March 2021	2,190	2,218

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 pay policy is determined by our sponsoring department, BEIS.

Our Trade Union are Prospect and we have an extant framework on how we engage and consult. We have involved our Trade Union on our COVID-19 response and use our current mechanisms to seek their feedback and thinking on current issues.

UKAEA is committed to promoting equality, diversity, and inclusion inside and outside of the organisation, and to ensuring that the working environment is welcoming, supportive, and inclusive for all. In 2020 we launched a 'Being Inclusive' strategy as a five-year campaign co-ordinating a series of actions centring around four main commitments:

- **People:** "UKAEA will take positive action to improve the opportunities and lived experience of all individuals working at, or interacting with, the organisation."
- **Environment:** "UKAEA will take positive steps to identify and improve the physical working environment for all of its people, particularly those with disabilities, whether they are visible or hidden."
- **Communication and engagement:** "UKAEA will improve internal and external communications to fully reflect its EDI commitment and progress to maximise the awareness and engagement of all stakeholders".
- **Policies and practices:** "UKAEA will integrate equality, diversity and inclusion into all our policies and practices".

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 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.

Expenditure on consultancy

UKAEA spend on consultancy was £138.2k (2020 nil). Consultants are hired to work on projects in a number of specific situations: where UKAEA does not have the skills set required within its support services; where the particular requirement falls outside the core business; or where an external, independent perspective is required. When used appropriately, consultancy can be a cost effective and efficient way of getting the temporary and skilled external input that UKAEA needs.

The expenditure on temporary staff was £24,859k (2020: £21,151k), as detailed in the Staff costs note above. The increase year-on-year relates mainly to temporary staff recruited to support the increasing breadth of programmes. Professional and technical services are sourced externally and included in the expenditure analysis note 9.3.

Expenditure on sponsorship

Sponsorship for the Online Autism at Work Summit, £5k.

ACCOUNTABILITY REPORT**Off-payroll appointments**

(a) Off-payroll engagements as at 31 March 2021, for more than £245 per day or greater

Number of existing engagements	204
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Of which the number that have existed at the time of reporting for

Less than one year	70
Between one and two years	55
Between two and three years	34
Between three and four years	15
More than four years	30

(b) All highly paid off-payroll workers engaged at any point during the year ended 31 March 2021, earning £245 per day or greater

Number of new engagements, or those that reached six months in duration, between 1 April 2020 and 31 March 2021	100
---	-----

Of which:

Number assessed as within the scope of IR35	97
Number assessed as not within the scope of IR35	3

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	-

(c) Off-payroll engagements of board members, and/or senior officials with significant financial responsibility, between 1 April 2020 and 31 March 2021

Number of off-payroll engagements of board members, and/or senior officials with significant financial responsibility, during the financial year	1
--	---

Total number of individuals on payroll that have been deemed "board members, and/or senior officials with significant financial reporting responsibility" during the year.	15
--	----

(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 2020 and 31 March 2021.

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.	-
--	---

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 2021: The third off-payroll Director is an employee of UKAEA and on UKAEA payroll.

ACCOUNTABILITY REPORT

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
12	12

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%	5
1-50%	7
51-99%	-
100%	-

Table 3: Percentage of pay bill spent on facility time

	Figures £
Total cost of facility time	10,188
Total pay bill	83,491,615
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
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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	
	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20
<£10,000	0	0	0	2	0	2
£10,000 - £25,000	0	0	0	0	0	0
£25,000 - £50,000	0	0	0	0	0	0
£50,000 - £100,000	0	0	0	0	0	0
£100,000 - £150,000	0	0	0	0	0	0
Total number of exit packages	0	0	0	2	0	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 reportable Losses and Special Payments of £798k in the year (on an accruals basis). This includes: Foreign Exchange Losses of £346k (See 6.2 Notes the Accounts), due to timing differences on realised transactions and restatement of future Euro receivables at Year End exchange rates. An estimated expected credit loss of £376k for a commercial tenant in respect to outstanding rent and direct costs.

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 for the 2020-21 reporting period. The ongoing disruption caused by the pandemic has created significant economic uncertainty, and this uncertainty is expected to continue throughout 2021. 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. 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



Professor Ian Chapman
Chief Executive and Accounting Officer
15th July 2021

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 2021 under the Atomic Energy Authority Act 1954. The financial statements comprise: The Group and Authority Statements of Comprehensive Income, Financial Position, Cash Flows, Changes in Taxpayers' Equity; and the related notes, including the significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable law and International Accounting Standards as interpreted by HM Treasury's Government Financial Reporting Manual.

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 Group's and of the United Kingdom Atomic Energy Authority's affairs as at 31 March 2021 and of Group's and Authority'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.

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), applicable law 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 2019. I have also elected to apply the ethical standards relevant to listed entities. I am independent of the United Kingdom Atomic Energy Authority in accordance with the ethical requirements that are relevant to my audit of 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

In auditing the financial statements, I have concluded that United Kingdom Atomic Energy Authority's use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

Based on the work I have performed, I have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the United Kingdom Atomic Energy Authority's ability to continue as a going concern for a period of at least twelve months from when the financial statements are authorised for issue.

My responsibilities and the responsibilities of the Board and the Accounting Officer with respect to going concern are described in the relevant sections of this certificate.

The going concern basis of accounting for UKAEA is adopted in consideration of the requirements set out in International Accounting Standards as interpreted by HM Treasury's Government Financial Reporting Manual, which require entities to adopt the going concern basis of accounting in the preparation of the financial statements where it anticipated that the services which they provide will continue into the future.

ACCOUNTABILITY REPORT

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 certificate thereon. The Board and the Accounting Officer is responsible for the other information. My opinion on the financial statements does not cover the other information and except to the extent otherwise explicitly stated in my certificate, 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 I identify such material inconsistencies or apparent material misstatements, I am required to determine whether this gives rise to a material misstatement in the financial statements themselves. 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, based on the work undertaken in the course of the audit:

- 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; and
- the information given in the Performance and Accountability Reports for the financial year for which the financial statements are prepared is consistent with the financial statements.

Matters on which I report by exception

In the light of the knowledge and understanding of the United Kingdom Atomic Energy Authority and its environment obtained in the course of the audit, I have not identified material misstatements in the Performance and Accountability report. 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
- certain disclosures of remuneration specified by HM Treasury's Government Financial Reporting Manual are not made; 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.

Responsibilities of the Board and Accounting Officer for the financial statements

As explained more fully in the Statement of Accounting Officer's Responsibilities, the Board and the Accounting Officer, is responsible for:

- the preparation of the financial statements in accordance with the applicable financial reporting framework and for being satisfied that they give a true and fair view.
- internal controls as the Board and the Accounting Officer determines is necessary to enable the preparation of financial statement to be free from material misstatement, whether due to fraud or error.
- assessing the United Kingdom Atomic Energy Authority's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Board and the Accounting Officer anticipates that the services provided by United Kingdom Atomic Energy Authority will not continue to be provided in the future

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.

My objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue a certificate that includes my opinion. 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.

I design procedures in line with my responsibilities, outlined above, to detect material misstatements in respect of non-compliance with laws and regulation, including fraud.

My procedures included the following:

- Inquiring of management, the United Kingdom Atomic Energy Authority's head of internal audit and those charged with governance, including obtaining and reviewing supporting documentation relating to the United Kingdom Atomic Energy Authority's policies and procedures relating to:
 - identifying, evaluating and complying with laws and regulations and whether they were aware of any instances of non-compliance;
 - detecting and responding to the risks of fraud and whether they have knowledge of any actual, suspected or alleged fraud; and
 - the internal controls established to mitigate risks related to fraud or non-compliance with laws and regulations including the United Kingdom Atomic Energy Authority's controls relating to the Atomic Energy Authority Act 1954 and Managing Public Money.
- discussing among the engagement team regarding how and where fraud might occur in the financial statements and any potential indicators of fraud. As part of this discussion, I identified potential for fraud in the following areas: revenue recognition, and posting of unusual journals.
- obtaining an understanding of the United Kingdom Atomic Energy Authority's framework of authority as well as other legal and regulatory frameworks that the United Kingdom Atomic Energy Authority operates in, focusing on those laws and regulations that had a direct effect on the financial statements or that had a fundamental effect on the operations of the United Kingdom Atomic Energy Authority. The key laws and regulations I considered in this context included the Atomic Energy Authority Act 1954, Managing Public Money, Employment Law and tax Legislation.

In addition to the above, my procedures to respond to identified risks included the following:

- reviewing the financial statement disclosures and testing to supporting documentation to assess compliance with relevant laws and regulations discussed above
- enquiring of management, the Audit Committee and in-house legal counsel concerning actual and potential litigation and claims;
- reading minutes of meetings of those charged with governance and the Board;
- in addressing the risk of fraud through management override of controls, testing the appropriateness of journal entries and other adjustments; assessing whether the judgements made in making accounting estimates are indicative of a potential bias; and evaluating the business rationale of any significant transactions that are unusual or outside the normal course of business;
- performing analytical procedures to identify any unusual or unexpected relationships that may indicate risks of material misstatement due to fraud; and
- reviewing internal audit reports.

I also communicated relevant identified laws and regulations and potential fraud risks to all engagement team members including internal specialists and significant component audit teams and remained alert to any indications of fraud or non-compliance with laws and regulations throughout the audit.

A further description of my responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at: www.frc.org.uk/auditorsresponsibilities. This description forms part of my certificate.

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.

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.

Report

I have no observations to make on these financial statements.

Gareth Davies
Comptroller and Auditor General

Date 16th July 2021

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

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

for the year ended 31 March 2021

	Note	Group		Authority	
		2021 £k	2020 £k	2021 £k	2020 £k
Income					
Revenue	5	176,918	155,622	173,687	153,294
Other Income		5,034	555	5,808	726
Less: share of revenue of joint venture		(3,232)	(2,328)	-	-
		178,720	153,849	179,495	154,020
Expenditure					
Raw materials and consumables	9	36,413	36,286	36,413	36,286
Other external expenses	9	67,119	45,315	67,119	45,315
Staff costs	6	108,350	88,429	108,350	88,429
Depreciation, amortisation and impairment		3,804	2,386	3,804	2,386
Other expense		2,376	(224)	3,014	611
Costs charged to provisions		(40)	(345)	(40)	(345)
		218,022	171,847	218,660	172,682
Revaluation adjustment		(691)	(1,222)	(691)	(1,222)
Costs capitalised		(40,650)	(16,517)	(40,650)	(16,517)
		176,681	154,108	177,319	154,943
Operating (loss)/profit		2,039	(259)	2,176	(923)
Finance income	8	60	226	41	169
Finance expense	8	(10)	(83)	(10)	(83)
Profit/(loss) on disposal of assets		-	879	-	879
Share of profit/(loss) of joint venture after tax	13	4,570	1,545	-	-
Profit/(loss) before tax	9	6,659	2,308	2,207	42
Current tax credit – RDEC	10	5,334	4,497	5,334	4,497
Deferred tax (debit)/credit	10	(1,393)	(548)	(1,393)	(548)
Profit/(loss) for the year		10,600	6,257	6,148	3,991
Other comprehensive income					
Net gain/(loss) on revaluations		18,232	2,745	18,217	2,391
Actuarial gains/(losses) on defined benefit pension plans		(17)	(133)	(17)	(133)
Income tax (debit)/credit relating to components of other comprehensive income		(1,072)	(903)	(1,072)	(903)
Other comprehensive income for the year		17,143	1,709	17,128	1,355
Total comprehensive income for the year		27,743	7,966	23,276	5,346

The notes on pages 116 to 144 are an integral part of these financial statements.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

as at 31 March 2021

		Group		Authority	
	Note	2021 £k	2020 £k	2021 £k	2020 £k
Non-current assets:					
Property, plant and equipment	11	130,116	75,332	130,116	75,332
Investment property	12	54,549	53,857	54,549	53,857
Intangible assets	11	119	-	119	-
Financial assets	13	56,171	51,588	18,623	18,623
Other receivables	15	482,380	466,971	482,380	466,971
Total non-current assets		723,335	647,748	685,787	614,783
Current assets					
Inventories		-	114	-	114
Trade and other receivables	15	37,655	33,652	38,559	34,880
Financial assets	13	4,611	5,599	-	-
Cash and cash equivalents	16	75,453	60,455	73,109	58,239
Total current assets		117,719	99,820	111,668	93,233
Total assets		841,054	747,568	797,455	708,016
Current liabilities					
Trade and other payables	17	72,406	60,278	72,394	60,264
Provisions for liabilities and charges	20	6,211	5,295	5,875	4,995
Total current liabilities		78,617	65,573	78,269	65,259
Total assets minus current liabilities		762,437	681,995	719,186	642,757
Non-current liabilities					
Other payables	17	766	1,537	766	1,537
Deferred income	18	9,237	10,749	9,237	10,749
Deferred income tax liabilities	19	11,968	9,502	11,968	9,502
Provisions for liabilities and charges	20	487,444	471,963	486,902	470,967
Total non-current liabilities		509,415	493,751	508,873	492,755
Assets less liabilities		253,022	188,244	210,313	150,002
Taxpayers' equity					
General reserve		13,658	13,658	13,658	13,658
Revaluation reserve		31,107	14,470	31,107	14,470
Capital grants reserve		79,788	45,124	79,788	45,124
Retained earnings		128,469	114,992	85,760	76,750
Total taxpayers' equity		253,022	188,244	210,313	150,002

The notes on pages 116 to 144 are an integral part of these financial statements.



Professor Ian Chapman
Chief Executive and Accounting Officer
15th July 2021

CONSOLIDATED STATEMENT OF CASH FLOWS

as at 31 March 2021

	Note	Group		Authority	
		2021 £k	2020 £k	2021 £k	2020 £k
Cash flows from operating activities					
Profit/(loss) for the year		10,600	6,257	6,148	3,991
Adjustments for non-cash transactions:					
- Depreciation, amortisation and impairment		3,804	2,386	3,804	2,386
- Deferred income released	18	(3,731)	(348)	(3,731)	(348)
- Change in fair value of investment property	12	(691)	(1,222)	(691)	(1,222)
- Loss on disposal of property, plant and equipment		-	-	-	-
- Loss/(profit) on sale of investment property		-	(879)	-	(879)
- Net finance income recognised		(50)	(143)	(31)	(86)
- Income tax debit/(credit)	10	(3,941)	(3,949)	(3,941)	(3,949)
- Share of loss/(profit) of joint venture		(4,570)	(1,545)	-	-
Changes in working capital:					
- (Increase)/decrease in trade and other receivables		561	(5,062)	885	(6,133)
- (Increase)/decrease in investments - not in last year		988	-	-	-
- (Increase)/decrease in inventories		114	(102)	114	(102)
- (Increase)/decrease in current financial assets		-	1,212	-	-
- Increase/(decrease) in trade and other payables		13,578	11,262	13,578	11,259
- Use of and change in provisions, net of the movement on reimbursement receivables		1,731	(3,309)	2,149	(1,287)
Net cash inflow/(outflow) from operating activities		18,393	4,558	18,284	3,630
Cash flows from investing activities					
Purchase of property, plant and equipment	11	(40,365)	(18,472)	(40,365)	(18,472)
Purchase of intangible assets	11	(125)	-	(125)	-
Sale of investment property		-	973	-	973
Investment in joint venture		-	-	-	-
Net cash inflow/(outflow) from investing activities		(40,490)	(17,499)	(40,490)	(17,499)
Cash flows from financing activities					
Grant from sponsoring department		37,035	15,777	37,035	15,777
Interest received		60	226	41	169
Net cash inflow/(outflow) from financing activities		37,095	16,003	37,076	15,946
Net increase/(decrease) in cash and cash equivalents in the period		14,998	3,062	14,870	2,077
Cash and cash equivalents at the beginning of the period		60,455	57,393	58,239	56,162
Cash and cash equivalents at the end of the period		75,453	60,455	73,109	58,239

The notes on pages 116 to 144 are an integral part of these financial statements.

CONSOLIDATED STATEMENT OF CHANGES IN TAXPAYERS' EQUITY

for the year ended 31 March 2021

Group	General reserve £k	Revaluation reserve £k	Capital grants reserve £k	Retained earnings £k	Total £k
Balance at 1 April 2019	13,658	12,986	31,120	107,135	164,899
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	-
Balance at 31 March 2020	13,658	14,470	45,124	114,992	188,244
Changes in Taxpayers' Equity 2020/21					
Capital Grant from sponsoring department	-	-	37,035	-	37,035
Total comprehensive income for the year	-	17,143	-	10,600	27,743
Depreciation transfer	-	(506)	(2,371)	2,877	-
Balance at 31 March 2021	13,658	31,107	79,788	128,469	253,022

Authority	General reserve £k	Revaluation reserve £k	Capital grants reserve £k	Retained earnings £k	Total £k
Balance at 1 April 2019	13,658	12,986	31,120	71,513	129,277
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	-
Balance at 31 March 2020	13,658	14,470	45,124	76,750	150,002
Changes in Taxpayers' Equity 2020/21					
Capital Grant from sponsoring department	-	-	37,035	-	37,035
Total comprehensive income for the year	-	17,143	-	6,131	23,276
Depreciation transfer	-	(506)	(2,371)	2,877	-
Balance at 31 March 2021	13,658	31,107	79,788	85,760	210,313

The notes on pages 116 to 144 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 (FRoM) issued by HM Treasury as updated annually. The accounting policies contained in the FRoM apply International Financial Reporting Standards (IFRS) as adapted or interpreted for the public sector. Where the FRoM 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. 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.

ANNUAL ACCOUNTS

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.

(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.

(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.

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 2021.

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

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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.

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.

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 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 2020/21 FReM and have not been early adopted by the Authority:

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

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

IFRS 16 – Leases (IAS 17 replacement – Leases) – effective date 1 January 2019, with adoption mandated in the FReM from 1 April 2022. The practical expedient that an entity should not reassess whether a contract is, or contains, a lease at the date of initial application has been applied.

UKAEA meets the criteria for early adoption set out in the 2020/21 FReM as a BEIS partner organisation, transition details are stated in Note 21 Operating Leases

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.

(a) 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.

(b) 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.

(c) 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.

(d) 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 – operational costs, management and development of the Culham and Harwell campuses for future scientific use

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Other segments include grant-in-aid funding and insurance. None of these segments meets any of the criteria for determining reportable segments in 2021 or 2020. The results of these segments are included in the “other” column in the segmental analyses below.

The segment information for the reportable segments for the years ended 31 March 2021 and 31 March 2020 is as follows:

	Fusion research £k	Property management £k	Other £k	Total £k
Year ended 31 March 2021				
External segment revenue	157,188	9,558	10,172	176,918
Less: Share of revenue of joint venture	-	(3,232)	-	(3,232)
Other income	5,034	-	-	5,034
Expenditure	(160,543)	(7,255)	(9,574)	(177,372)
Investment property revaluation	-	691	-	691
Operating profit/(loss)	1,679	(238)	598	2,039
Finance income	-	-	60	60
Finance expense	-	-	(10)	(10)
Share of profit/(loss) of joint venture	-	4,570	-	4,570
Profit/(loss) before income tax	1,679	4,332	648	6,659
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)
Loss 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

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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

	2021 £k	2020 £k
Revenues		
Total revenue for reportable segments	166,746	145,541
Other revenue	10,172	10,081
Consolidated revenue per Statement of Comprehensive Income	176,918	155,622
Profit or loss		
Total (loss) / profit or loss for reportable segments	6,011	829
Other profit or loss	648	1,479
Consolidated (loss) / profit before income tax per Statement of Comprehensive Income	6,659	2,308

Note, the reported 2020 comparatives have been corrected from the prior year report.

Geographical segments

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

	2021 £k	2020 £k
Group Revenue		
United Kingdom	135,262	99,577
Europe	43,055	55,511
Rest of the World	404	534
	178,721	155,622

Revenue from major customers

	2021 £k	2020 £k
European Commission	37,130	42,268

Income from the European Commission is attributable to the fusion research segment, the main component is the JET Operating Contract. In 2021 work completed in respect of the anticipated scope of the new EUROfusion Framework 9 was reported as UK funded (£5,064k). In future, once this new framework programme has completed the approval processes and work package instructions are issued, this spend may be applicable for EUROfusion funding and would subsequently be reported as Europe geographical revenue.

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 2021, £14,332k (2020, £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.

Contract balances	Note	2021 £k	2020 £k
Trade receivables	15	1,667	1,743
Contract assets	15	579	549
Contract liabilities	17	(30)	(19)

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.

	2021 £k	2020 £k	2021 £k	2020 £k
	Contract Assets	Contract Assets	Contract Liabilities	Contract Liabilities
Contract assets/liabilities at the beginning of the period	549	918	(19)	(197)
Contract assets for performance obligations satisfied but not yet invoiced		(369)	-	-
Contract liability for payments received in advance of the satisfaction of performance obligations	-	-	(11)	178
Changes in the measure of progress	30	-	-	-
Contract Assets / Liabilities at year end	579	549	(30)	(19)

ANNUAL ACCOUNTS**6 Staff Costs and Operating profit****6.1 Staff costs**

Staff costs comprise:

	2021 £k	2020 £k
Permanently employed staff:		
Salaries, bonuses and allowances	65,544	52,778
Social security costs	7,461	6,073
Pension costs – defined contribution plans (see below)	10,486	8,427
	83,491	67,278
Other staff	24,859	21,151
	108,350	88,429

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 £10,460k (2020: £8,402k). The total contributions paid by UKAEA during the year to the SPPP were £26k (2020: £25k)

6.2 Operating profit

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

	2021 £k	2020 £k
Change in fair value of investment property	(691)	(1,222)
Net foreign exchange losses/(gains)	346	(208)
Operating lease rentals – plant, machinery and vehicles	284	150
Non-cash items:		
– Depreciation, amortisation and impairment	3,804	2,386

7 Auditors' remuneration

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

	2021 £k	2020 £k
Audit fees		
UKAEA	78	68

2021: A further increase of £7k has been agreed subsequent to the year end.

Audit of subsidiary and joint venture

The audit fee paid to the auditors of AEAIL was £10k (2020: £10k). The audit fee paid to the auditors of HSIC PubSP, in which UKAEA has a share of one half, was £11k (2020: £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 (2020: £59k).

ANNUAL ACCOUNTS**8 Finance income and expense**

	Group		Authority	
	2021 £k	2020 £k	2021 £k	2020 £k
Profit/(loss) for the year				
Interest on term bank deposits	60	226	41	169
Expense				
Revalorisation of provisions:				
- Unwinding of discount	(1,140)	662	(1,140)	662
- Adjustments to reimbursement receivables	1,169	(685)	1,169	(685)
Interest on unfunded retirement benefits	(39)	(60)	(39)	(60)
	(10)	(83)	(10)	(83)

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

9 Analysis of net income**9.1 Analysis of net income**

	Group	
	2021 Total £k	2020 Total £k
Income		
Income from activities	162,586	141,641
Contracts with customers	14,332	13,981
Other income	5,034	555
Interest receivable	60	226
Share of revenue of joint venture	(3,232)	(2,328)
Share of profit/(loss) of joint venture	4,570	1,545
	183,350	155,620
Expenditure		
Raw materials and consumables	36,413	36,288
Other external expense	67,119	45,315
Staff costs	108,350	88,429
Other expense	2,376	(224)
Costs charged to provisions	(40)	(345)
Costs capitalised	(40,650)	(16,517)
Revaluation adjustment	(691)	(1,222)
Non-cash items:		
- Depreciation and impairment	3,804	2,384
- Finance expense	10	83
- (Profit)/loss of fixed asset disposal	-	(879)
	176,691	153,312
Net income after interest and before tax	6,659	2,308

ANNUAL ACCOUNTS**9.2 Expenditure Analysis – Staff Costs**

Staff Costs see note 6.1

9.3 Expenditure Analysis – Raw Materials, Consumables and Other External Expenses

	Group	
	2021	2020
	£k	£k
Raw Materials and Consumables		
Plant, Equipment and Spares	18,062	19,834
Electricity	7,249	9,325
Gases	1,244	1,521
IT Equipment	4,428	2,709
Software	2,245	1,069
Other	3,185	1,832
	36,413	36,288
Other External Expenses		
Design and Construction	21,776	8,690
Site Maintenance and Services	10,362	9,054
Inspection Services	6,586	6,470
Pensions Administration	1,422	1,652
Professional and Technical Services	20,671	12,278
Travel & Subsistence	393	1,619
Other External	5,909	5,553
	67,119	45,315

ANNUAL ACCOUNTS**10 Income tax (expense)/credit**

	Group and Authority	
	2021	2020
	£k	£k
Profit/(loss) for the year		
Current tax credit (RDEC)	5,334	4,528
Adjustments relating to previous years	-	(31)
	5,334	4,497
Deferred tax		
Origination and reversal of temporary differences	(131)	(867)
Recognition of deferred tax asset (Note 19)	(1,262)	319
	(1,393)	(548)
Total income tax (expense)/credit	3,941	3,949

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:

	2021	2020
	£k	£k
Profit/(loss) for the year	10,600	6,257
Income tax expense/(credit)	(3,941)	(3,949)
Profit/(loss) excluding income tax	6,659	2,308
Tax calculated at the standard UK corporation tax rate of 19% (2018: 19%)	1,265	439
Tax effects of:		
- Reversal of timing differences	(224)	224
- Expenses not deductible	(256)	(399)
- R&D expenditure credit under s104A CTA 2009	1,251	1,062
- Brought forward losses set against trading profits	(861)	(744)
- Current year profit offset against deferred tax asset	(496)	-
- Non-trading profits offset by RDEC credit	(701)	(444)
- Net RDEC claim 2020/21	(5,334)	-
- Net RDEC claim 2019/20	-	(4,528)
- Tax losses for which no deferred income tax asset was recognised	22	(137)
- Adjustments for previous periods	-	30
Current tax expense/(credit) for the year	(5,334)	(4,497)

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

	2021	2020
	£k	£k
Fair value gains on property, plant and equipment	1,073	903

11 Property, plant & equipment

11.1 Tangible Assets

Group and Authority	Land £k	Buildings £k	Leasehold Improvements £k	Plant and equipment £k	Assets under construction £k	Total £k
Cost or valuation						
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)/from investment property	-	619	-	-	(2,829)	(2,210)
At 31 March 2020	13,831	35,862	-	16,208	22,643	88,544
Additions	-	-	-	1,095	39,270	40,365
Disposals	-	-	-	-	-	-
Revaluation	15,549	2,668	-	-	-	18,217
Transfers within property plant and equipment	-	-	3,324	5,500	(8,824)	-
Transfer to investment property	-	-	-	-	-	-
At 31 March 2021	29,380	38,530	3,324	22,803	53,089	147,126
Depreciation and impairment						
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)
Depreciation charge	-	(1,463)	(83)	(2,252)	-	(3,798)
Disposals	-	-	-	-	-	-
Transfer to investment property	-	-	-	-	-	-
At 31 March 2021	-	(8,276)	(83)	(8,651)	-	(17,010)
Net book value						
At 31 March 2020	13,831	29,049	-	9,809	22,643	75,332
At 31 March 2021	29,380	30,254	3,241	14,152	53,089	130,116

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

A full triennial valuation of all buildings and land have been revalued as at 28 February 2021. 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.

Further to output in January 2021 from the Material Valuation Uncertainty Leaders Forum (UK) setup by RICS, Carter Jonas do not consider it is necessary to include a Material Uncertainty provision in respect of the valuation given the location, use and other characteristics of the property valued.

The Group again reviewed the appropriateness of valuations in light of the latest RICS guidance at the end of June 2021. Key factors in that assessment were that the land & buildings are all held for long term use, high occupancy and the reliance on depreciated replacement cost – with a significant proportion only recently constructed.

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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 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 2021 relating to classes subject to revaluation: Land 2021 £133k (2020, £133k) and Buildings 2021 £21,914k (2020, £22,870k).

There was £8,618k capital expenditure contracted for at the reporting date but not recognised in the financial statements (2020: £7,600k). This related mainly to assets in course of construction.

11.2 Intangible assets

Group and Authority	Software £k	Total £k
Cost		
At 31 March 2019	1,769	1,769
At 31 March 2020	1,769	1,769
Additions	125	125
At 31 March 2021	1,894	1,894
Amortisation		
At 31 March 2019	(1,769)	(1,769)
At 31 March 2020	(1,769)	(1,769)
Amortisation	(6)	(6)
At 31 March 2021	(1,775)	(1,775)
Net book value		
At 31 March 2020	-	-
At 31 March 2021	119	119

ANNUAL ACCOUNTS**12 Investment property**

	Group and Authority	
	2021	2020
	£k	£k
At 1 April	53,857	50,520
Change in fair value	691	1,222
Disposal	-	(95)
Net transfer from property, plant and equipment	-	2,210
At 31 March	54,548	53,857

Investment properties were valued at fair value at 28 February 2021 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.

Further to output in January 2021 from the Material Valuation Uncertainty Leaders Forum (UK) setup by RICS, Carter Jonas do not consider it is necessary to include a Material Uncertainty provision in respect of the valuation given the location, use and other characteristics of the property valued

The Group again reviewed the appropriateness of valuations in light of RICS guidance at the end of June 2021. 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.

The net book value under the historical cost model at 31 March 2021 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	
	2021	2020
	£k	£k
Rental income	2,143	2,420
Direct operating expenses:		
– Investment properties that generated rental income	2,073	1,849
– Investment properties that did not generate rental income	318	354
– Expected Credit Loss	376	-

The Expected Credit Loss is in respect to an outstanding rent and direct costs due from a Culham commercial tenant which has recently entered administration.

ANNUAL ACCOUNTS**13 Financial assets**

	Group		Authority	
	2021 £k	2020 £k	2021 £k	2020 £k
Non-current				
Movements during the year				
At 1 April	51,588	49,689	18,623	15,623
Investment in joint venture	-	-	-	3,000
Revaluation & profit on joint venture	4,583	1,899	-	-
	56,171	51,588	18,623	18,623
Total non-current assets				
Investment in subsidiary undertakings	-	-	3,000	3,000
Investment in joint venture	56,171	51,588	15,623	15,623
	56,171	51,588	18,623	18,623
Current				
Term bank deposits	4,611	5,599	-	-
	4,611	5,599	-	-

13.1 Investment in subsidiary undertakings

Name	Country of incorporation	Ownership interest %	
		2021	2020
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

ANNUAL 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 Science and Innovation Campus Limited Partnership (HSIC LP), 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	
	2021 £k	2020 £k
At 1 April	51,588	49,689
Investment in joint venture		-
Share of profit/(loss) net of tax	4,570	1,545
Revaluation	13	354
	56,171	51,588
Analysed as follows:		
Cost or valuation	32,249	32,236
Share of retained profits/(losses)	23,922	19,352
	56,171	51,588

The £4,570k share of profit of the joint venture (2020: profit of £1,545k) represents UKAEA's share of the operating profit of HSIC LP 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 and related to HSIC LP investment properties.

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

	Group	
	2021 £k	2020 £k
Profit/(loss) net of tax		
Income	3,232	2,328
Expenses	(3,393)	(3,181)
Net revaluation gain	4,731	2,398
	4,570	1,545
Assets		
Current assets	20,625	24,507
Non-current assets	59,951	52,330
	80,576	76,837
Liabilities		
Current liabilities	751	507
Non-current liabilities	23,654	24,742
	24,405	25,249
Net assets	56,171	51,588

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 £45.4m of investment properties (2019/20: £43.1m). The investment properties have been valued at market value, as at 31 March 2021 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 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 2021. 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 2021 was 0.15% (2020: 0.70%). 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 2021 and 31 March 2020. All financial liabilities of the Group were held at amortised cost at both 31 March 2021 and 31 March 2020.

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.

ANNUAL ACCOUNTS

15 Trade and other receivables	Group		Authority	
	2021	2020	2021	2020
Amounts falling due after more than one year:	£k	£k	£k	£k
Reimbursement receivables:				
- Site restoration	442,513	425,472	442,513	425,472
- Restructuring	34,143	36,971	34,143	36,971
Corporation Tax	5,724	4,528	5,724	4,528
	482,380	466,971	482,380	466,971
Amounts falling due within one year				
Trade receivables	2,783	5,498	2,783	5,498
Reimbursement receivables:				
- Site restoration	548	-	548	-
- Restructuring	3,144	3,265	3,144	3,265
Prepayments and accrued income	20,788	17,287	20,768	17,262
Contract assets - re revenue	8	-	8	-
Contract assets - direct costs (re WIP)	571	549	571	549
VAT	5,173	3,321	5,173	3,321
Corporation Tax	4,528	3,700	4,528	3,700
Other receivables	112	32	1,036	1,285
	37,655	33,652	38,559	34,880

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 £436k (2020: £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.

ANNUAL ACCOUNTS**16 Cash and cash equivalents**

	Group		Authority	
	2021 £k	2020 £k	2021 £k	2020 £k
At 1 April	60,455	57,393	58,239	56,162
Net change in cash and cash equivalent balances	14,998	3,062	14,870	2,077
	75,453	60,455	73,109	58,239

The following balances were held at 31 March:

Commercial banks and cash in hand	75,453	60,455	73,109	58,239
	75,453	60,455	73,109	58,239

17 Trade and other payables

	Group		Authority	
	2021 £k	2020 £k	2021 £k	2020 £k
Amounts falling due within one year				
Trade payables	4,843	2,955	4,843	2,955
Accrued costs	28,068	21,792	28,056	21,778
Payments received on account	36,138	32,032	36,138	32,032
Contract liabilities	30	19	30	19
Social security and other taxes	1,965	2,034	1,965	2,034
Other payables	1,362	1,446	1,362	1,446
	72,406	60,278	72,394	60,264

Amounts falling due after more than one year

Payments received on account	766	1,537	766	1,537
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18 Deferred income

	Group and Authority	
	2021 £k	2020 £k
At 1 April	10,749	7,927
Deferred income received	2,219	3,170
Released to income statement	(3,731)	(348)
At 31 March	9,237	10,749

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.

**19 Deferred income tax
Group and Authority**

	Investment property £k	Land and buildings £k	Total £k
Deferred tax liability			
At 31 March 2019	6,475	4,501	10,976
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

Movements during 2020/21:

Income statement debit/(credit):			
- Revaluation			-
- Change in tax rate	132	-	132
Charged directly to equity:			
- Revaluation	1,072	-	1,072
- Change in tax rate			-
At 31 March 2021	8,546	5,403	13,949

Deferred tax asset

At 31 March 2020		3,243
Increase/(decrease) in deferred tax asset		(1,262)
At 31 March 2021		1,981

Net deferred tax liability

At 31 March 2020	9,502
At 31 March 2021	11,968

Deferred tax liability

During 20/21, 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 during 2021/22. A deferred income tax asset of £203k 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 £1,778k 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 £1,981k has been netted off UKAEA's deferred tax liability in the Accounts as it fulfils the conditions for offsetting in IAS12.

ANNUAL ACCOUNTS**20 Provisions for liabilities and charges**

Group	Site restoration £k	Restructuring £k	Other £k	Total £k
At 1 April 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
Changes in price levels	-	197	22	219
Unwinding of discount	1,169	(209)	(3)	957
Discount charge	2,943	-	-	2,943
Provided in the year	13,477	509	2,013	15,999
Provisions not required written back	-	-	-	-
Provisions utilised in the year	-	(3,400)	(321)	(3,721)
At 31 March 2021	443,061	42,449	8,145	493,655

Note:

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

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

At 31 March 2021

Non-current	442,513	39,119	5,812	487,444
Current	548	3,330	2,333	6,211
	443,061	42,449	8,145	493,655

ANNUAL 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.

After the closure of JET, it will be the responsibility of the UKAEA to oversee the repurposing of the part of the Culham site on which JET is located. Where necessary, UKAEA work with the Nuclear Decommissioning Authority (or its authorised parties), as the body responsible for the disposal of higher activity waste.

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.

A detailed update was conducted in 2018/19. Annual updates have subsequently refreshed assumptions including pricing and results from discrete risk reviews. The historical cost base is uplifted to current prices, based on the information available at 31st March 21, noting the external expenditure (non-people) was adjusted to current values using an estimate of 2.6%, (£3.0m) more recent estimates would be lower at 1.1% (£1.3m). In 2020/21 specific agreed changes included the removal of 3 buildings from decommissioning plan on the basis that these have been agreed to be adopted by UKAEA as part of the ongoing campus infrastructure at the end of the current JET Operating Contract in November 2021.

This is the basis, together with high level assessment of changes, of the site restoration provision at the 31st March 2021.

The best estimate of the cost of dealing with the liabilities at 31 March 2021 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 2019/20
Short term	Up to and including 5 years	-0.02%	1.2%	1.22%	-1.48%
Medium term	Between 6 and 10 years	0.18%	1.6%	1.42%	-1.44%
Long term	Between 11 and 40 years	1.99%	2.0%	0.01%	-0.01%
Very long term	41 or more years	1.99%	2.0%	0.01%	-0.01%

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 2021 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 2021 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.

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

	Group and Authority	
	2021 £k	2020 £k
Not later than one year	548	-
Later than one year and not later than five years	88,462	9,167
Later than five years and not later than ten years	237,310	257,926
Later than ten years and not later than twenty years	116,741	158,379
Later than twenty years and not later than fifty years	-	-
	443,061	425,472

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

	Group and Authority 2021 (£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	548	548	548	548	548
Later than one year and not later than five years	88,462	90,044	86,902	86,884	90,079
Later than five years and not later than ten years	237,310	245,510	229,356	229,267	245,689
Later than ten years and not later than twenty years	116,741	123,436	110,382	110,418	123,463
	443,061	459,538	427,188	427,117	459,779

The best estimate of the undiscounted cost of dealing with the liabilities is £413,838k (2020: £401,350k). The best estimate of the discounted cost is £443,061k (2020: £425,472k). 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	413,838	446,882
Discounted costs	443,061	478,438

The best estimate (P50) value is supported by a statistical analysis of cost and estimation uncertainties, along with other discrete risks. 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 2021. 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 2020/21 Annual Accounts.

A later start date to decommissioning programme, if the cashflows were delayed by 2 years, would decrease the discounted cost to £438.43m (compared to £443.1m), due to a greater proportion of the spend profile being subject to the long-term discount rate provided by HM Treasury.

The basis of the LifeTime Plan was closure at the end of 2024. However, the Scientific Campaign is now expected to cease at the end of 2023, if there was an earlier closure date for JET this could mean the timing of cash flows moving into earlier years. The impact of inflation and discounting (time/value of money) of one year is £0.2m, £442.9m vs £443.1m.

ANNUAL 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 2019. 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 (0.95)% in 2020/21 (2020: (0.5)%). The undiscounted cost of the group provisions is £39,591k (2020: £43,673k) 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	
	2021	2020
	£k	£k
Not later than one year	3,329	3,460
Later than one year and not later than five years	12,655	13,279
Later than five years	26,465	28,613
	42,449	45,352

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 June 2021, 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 £2,069k has been made relating to the disposal of operational waste arising from UKAEA's contract to operate JET. 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 £2,063k. In addition, UKAEA has made provision of £765k 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:

	2021	2020
	£k	£k
Not later than one year	533	175
Later than one year and not later than five years	1,322	814
Later than five years	881	1,176
	2,736	2,165

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

ANNUAL ACCOUNTS**IFRS 16 - IAS 8 Disclosures**

The Group will be adopting IFRS 16 for the first time from 1st April 2021 the expected impact on the Statement of Comprehensive Income (SoCI) and Statement of Financial Position (SoFP) have been detailed below.

	2021/22 IAS 17 expected	2021/22 IFRS 16 expected	Increase/ decrease expected	2020/21 reported
	£m	£m	£m	£m
SoCI impacts arising from IFRS 16				
Asset depreciation	0.0	0.6	0.6	0.0
Interest expense on discounted lease liability	0.0	0.1	0.1	0.0
IAS 17 basis Rental payments	0.6	0.0	(0.6)	0.3
Total net impact to SoCI	0.6	0.7	0.1	0.3

	2021/22 IAS 17 expected	2021/22 IFRS 16 expected	Increase/ decrease expected	2020/21 reported
	£m	£m	£m	£m
SoFP impacts IFRS 16				
Right of use assets commenced	0.0	5.4	5.4	0.0
Lease liabilities commenced	0.0	(4.8)	(4.8)	0.0
Total net impact to SoFP	0.0	0.6	0.6	0.0

Lease Liability note

	£m
Total commitments under operating leases as at 31/03/21	2.7
Total lease liability as at 01/04/21	4.8

Under IFRS16 tenant lease breaks available to the Group have only been included in the calculation of the lease liability lease where there is a high degree of certainty that the Group would exercise them. The Group currently does not anticipate exercising any available lease breaks.

ANNUAL 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:

	2021	2020
	£k	£k
Not later than one year	1,772	2,254
Later than one year and not later than five years	3,263	4,438
Later than five years	30,223	30,659
	35,258	37,351

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 2020/21, 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.

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LIST OF ABBREVIATIONS

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

| Notes

The UK Atomic Energy Authority's mission is to lead the delivery of sustainable fusion energy and maximise scientific and economic benefit



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