

REPORT SUMMARY SHEET

SUPPORTING THE DECARBONISATION OF AVIATION

Purpose

At the 21 September West of England Joint Committee meeting, a motion was approved to oppose the latest plans to expand Bristol Airport. In approving the motion, the Joint Committee recognised *'the importance of the wider aerospace centre of excellence at Filton and its major contribution to our economy, skills base and industrial heritage'* and the *'ongoing efforts being pioneered locally by industry to decarbonise aviation, including through the Jet Zero initiative'*. The committee requested *'that West of England Chief Executives bring a report to the October 2021 meeting setting out a range of proposals to support the decarbonisation of aviation'*.

Summary

In response, this report describes the current shape and scale of the aerospace sector in the region and sets out what national and regional initiatives are in place (or emerging) to support the industry on the journey to decarbonising aviation.

The report also identifies a number of opportunities to be developed potentially into a joint plan with industry, to ensure the aerospace sector in the West of England can effectively restructure and continue to be a major source of sustainable and well-paid jobs for our residents.

Recommendations

Members of the Joint Committee are asked:

1. To note the breadth of activity happening across the region to support the decarbonisation of aviation, the associated risks, gaps and opportunities, and the need for more action.
2. To support the strategic proposals for accelerated scaled-up action and the development of a joint plan with industry, with a progress report to come back to Committee at its meeting in January 2022 through the West of England Chief Executives.

Contact officer: Stephen Bashford

Position: Director of Business & Skills

Email: Stephen.Bashford@westofengland-ca.gov.uk

REPORT TO: WEST OF ENGLAND JOINT COMMITTEE

DATE: 15 OCTOBER 2021

REPORT TITLE: SUPPORTING THE DECARBONISATION OF AVIATION

DIRECTOR: STEPHEN BASHFORD, DIRECTOR OF BUSINESS AND SKILLS

AUTHOR: ANTONY MERRITT, HEAD OF ENTERPRISE, INWARD INVESTMENT AND TRADES

Purpose of Report

- 1.1 At the 21st September West of England Joint Committee meeting it was resolved to oppose the latest plans to expand Bristol Airport. In reaching the resolution, the Committee recognised *'the importance of the wider aerospace centre of excellence at Filton and its major contribution to our economy, skills base and industrial heritage'* and the *'ongoing efforts being pioneered locally by industry to decarbonise aviation, including through the Jet Zero initiative'*. The committee requested *'that West of England Chief Executives bring a report to the October 2021 meeting setting out a range of proposals to support the decarbonisation of aviation'*.
- 1.2 In response, this report describes the current shape and scale of the aerospace sector in our region and details what national and regional initiatives are in place (or emerging) to support the industry on the journey to decarbonising aviation.
- 1.3 The report then proceeds to set out a number of strategies opportunities to be developed at pace into a joint delivery plan with industry, to mitigate risks and capture the opportunities, needed to ensure the aerospace sector in the West of England can effectively restructure and continue to be a major source of sustainable and well-paid jobs for our residents.

Recommendation(s) for West of England Combined Joint Committee:

1. To note the breadth of activity happening across the region to support the decarbonisation of aviation, the associated risks, gaps and opportunities, and the need for more action.
2. To support the strategic proposals for accelerated scaled-up action and the development of a joint plan with industry, with a progress report to come back to Committee at its meeting in January 2022 through the West of England Chief Executives.

Background / Issues for Consideration

Regional and National Context

- 2.1 The South West of England is home to 14 of the 15 most significant aerospace companies in the world, supported by world-class universities and specialist technology centres, a supply chain of over 800 companies, a range of aerospace research facilities, and a highly skilled talent pool. The sector is a valuable contributor to regional and national prosperity, contributing £7 billion each year and employing more than 98,000 people.
- 2.2 The West of England is at the heart of this globally significant cluster. Its combined strengths have created an ecosystem that exists nowhere else in the UK and only in a handful of other regions internationally – the region stands out as the biggest aerospace cluster in the UK and second largest in Europe. This significant cluster of primes and supply chain companies covers a wide range of aerospace capabilities through wings and large structures to engines, and through a range of systems technologies.
- 2.3 The region is well placed to lead the next chapter for global aerospace development and act with greater pace to decarbonise aviation. As an already thriving cluster, cross sector collaborations provide great opportunities to pioneer new product development and high value design, operational efficiency, shared skills, and shared ambitious targets to reduce carbon emissions, not just within aviation but across wider transport and industrial sectors. Scaling up our ambition further, will mean we can have an even greater impact in addressing the climate emergency, while also securing a strong competitive advantage against other international competitors, helping to retain jobs and skills in our region.
- 2.4 The UK was the first major economy in the world to set a legislative target of net zero by 2050. UK Government has also published a Decarbonising Transport Plan, with targets of decarbonised domestic aviation and airport operations by 2040. Eliminating its impact on the environment is the single biggest challenge for the aviation sector if it is to reach net zero international aviation by 2050. Demand for smart and sustainable aviation solutions is being driven by the UK's clean growth strategy.
- 2.5 There are a number of UK Government supported initiatives to decarbonise aerospace, generate fuels such as hydrogen, and develop green skills. For example:
- Jet Zero Council: a partnership between industry and government with the aim of delivering zero-emission transatlantic flights within a generation.
 - Fly Zero: an Aerospace Technology Institute (ATI) project to determine how the UK might best contribute to zero-emission aircraft. The programme will pull together expertise from across the UK supply chain and universities in an initial 12-month programme to look at the design challenges and market opportunities of potential zero-emission aircraft concepts. The programme has formally

adopted Bristol Airport as one of the focus airports for its studies.

- National Government Support: in 2020, the Government signed off on £200 million in grants, matched by industry to support projects including developing high-performance engines, new wing designs, and ultra-lightweight materials to reduce fuel consumption.

Review of current regional activity

- 2.6 The Combined Authority leads the **South West Aerospace** consortium – a collaboration between industry, the regional Local Enterprise Partnerships, academia and research and technology organisations, with a core aim to deliver regional economic success and growth in the sector. The consortium exists to deliver a strategic approach and consistency in plans to support the local implementation of UK Government’s Aerospace Ambitions in the South West.
- 2.7 Annex 1 sets out in more detail some of the key business, innovation and skills assets capable of developing cutting-edge, green technologies, which can help achieve rapid decarbonisation and at the same generate new growth and employment opportunities.
- 2.8 For example, industry led investments like **the Aerospace Integration, Research and Test Centre** by **Airbus** and **GKN’s Global Technology Centre**, are delivering innovative products and materials, and leading on the commercialisation of sustainable aviation fuels (SAFs) including active involvement in the development of hydrogen. GKN is delivering a £54m collaborative H2GEAR programme to push hydrogen technology and accelerate aerospace decarbonisation to zero emissions (entry-into-service of hydrogen-powered aircraft could be as early as 2026). **Rolls Royce** is also engaged in the development of SAFs and pioneering optimisation of industrial footprint emissions and engine electrification.
- 2.9 The **National Composites Centre** is leading work to develop new advanced composite materials which will unlock the design potential for future, cleaner aircraft and propulsion systems, alongside development in renewable energy including wind turbines. Bristol Airport’s **Aviation Carbon Transition (ACT) Programme**, open to businesses and organisations in the region, is funding reductions in emissions from flight and transport activity.
- 2.10 The region’s universities bring unique strengths too - the **University of Bristol** is leading research into hydrogen storage, electric propulsion, aeroacoustics, and control systems; the **University of Bath** is at the forefront of applied research into propulsion systems and through a new ‘Bath Beacon’ will promote and accelerate hydrogen-related research; and the **University of the West of England (UWE)** offers an BEng in aerospace engineering and jointly hosts the Bristol Robotics Laboratory.
- 2.11 The Combined Authority has invested with industry in a range of strategically significant projects and world class facilities helping to build new innovative

capacity: the £10m **Digital Engineering Technology & Innovation (DETI) programme, working with the National Composites Centre** is creating disruptive technology advancements to achieve net zero, alongside skills support to inspire the next generation of digital engineers; and the **Institute of Advanced Automotive & Propulsion Systems (IAAPs)**, a new £70m development located at the Bristol and Bath Science, will support transition to the decarbonisation of aerospace propulsion through future fuels and electrification technologies.

- 2.12 Through investments like the **Business Innovation Fund** and the emerging **Made Smarter Programme**, the Combined Authority is providing support to the small businesses that form the extensive aerospace supply chain to decarbonise, increase digital adoption and resilience; and through its participation in the national **Future of Flight Programme** and working with the Department of International Trade, helping to target major new **inward investments** in sustainable aviation and advanced air mobility.
- 2.13 The West of England's universities and further education colleges have forged strong links with the aerospace and advanced engineering sector, developing new training provision and facilities which are fundamental to accelerating the journey to net zero. The **West of England Institute of Technology**, funded by the Department of Education and the Combined Authority, designs and delivers flexible, higher-level technical learning to equip people with the skills needed for digital innovation and emerging green technologies. Aerospace related training delivered by the Institute of Technology, is focused through a satellite centre based at the Global Technology Centre. The **Future Technology Centre led by Weston College** aims to up-skill learners with 'work ready' technology skills with a focus on advanced engineering, automated manufacturing and low carbon sectors.
- 2.14 Alongside this, the Combined Authority's £8m **Workforce for the Future** programme is offering specialist support to small businesses to plan for future skills needs. A recently launched phase two, will include additional targeted provision for developing green skills and digital learning factories, which will play a crucial role in addressing gaps and generating new skills opportunities as the region's aerospace sector restructures.

Further strategic opportunities

- 2.15 With these foundations in place, there is an opportunity for national, regional and local government to work with industry, higher and further education, to make even more rapid progress and firmly establish the region as a global leader in driving innovation to decarbonise aviation. We need to act quickly to address the climate emergency and to ensure other economies across Europe do not gain momentum ahead of us with the risk of jobs and skills draining from the region.
- 2.16 Below we set out a series of high-level strategic opportunities across four broad themes which will form the basis of a new joint plan with industry. This plan will draw together and maximise the value of existing investments within a coherent framework and position the region to leverage additional support and funding.

1. Influencing and Leadership:

- Establish a senior level public-private partnership group to focus on **Smart and Sustainable Aviation**, reporting into the new Climate Action Panel, to drive and monitor impact of the changes needed for rapid decarbonisation.
- Ensure the region and its businesses are **contributing to and benefiting from national activity – Aerospace Technology Institute, FlyZero, CPC Future Air Mobility and Future of Flight activities** – with the Combined Authority co-ordinating and supporting proposals from the region to secure increased levels of funding.
- Take urgent action to draw together **aerospace, aviation and energy sectors** to focus investment and action on net zero developments; ensure that the low carbon benefits of high value design in aviation are **shared across multiple sectors including other transport modes and in the development of renewable energy**.
- Use major events to showcase the contribution the region is making towards the decarbonisation of aviation and attract new investment for accelerated action e.g. through the **Global Investment Summit, COP26, GUAAS 2022 and Farnborough 2022**.

2. Technology & Innovation:

Utilising our unique research and innovation assets and harnessing the strengths of our world-class universities, we can significantly scale-up our innovation ambitions. We will:

- Extend the ground-breaking **Digital Engineering Technology and Innovation (DETI) Programme through an even more ambitious Phase 2**.

This work will accelerate digital transformation, innovation and productivity to position the UK as a global engineering leader for net zero. It will be delivered through an Advanced Engineering Partnership (AEP) of universities, RTOs and industry in partnership with the Combined Authority. Its focus will include – hydrogen propulsion systems and storage solutions and next generation clean energy solutions including for aerospace. Phase 2 will also see the development of a new Innovation Hub for Accelerated Net Zero Manufacturing, as well as further activity to accelerate product innovation across the sector and its extensive supply chain of SMEs.

- Build on the **Institute of Advanced Automotive & Propulsion Systems (IAAPs)** to expand its capacity, capability and facilities to support **electric and hydrogen aviation**.
- Work across the wider South West region to pioneer **green hydrogen testing, production, storage and distribution** with aerospace/ aviation as

priority end users. The testing of hydrogen and electric systems will accelerate certification and integrator knowledge (creating a systems integration approach).

- Put in place test facilities and flight test corridors to enable the test and demonstration of **environmentally-friendly air mobility vehicles** and net zero/ zero emission technologies.
- Explore the opportunity to **join the Advanced Aerial Mobility Cities and Regions Coalition, led by the World Economic Forum (WEF)**, to support international collaboration, policy making and sector development that promotes R&D and testing for new sustainable forms of aviation integrated into urban and regional transportation networks.

3. Sector and supply chain development

- Through the Combined Authority's **Invest Bristol and Bath** service, work with the Heart of the South West LEP and Department of International Trade to deliver the **Smart and Sustainable Aviation High Potential Opportunity (HPO)**. This will be promoted internationally to attract inward investors.
- Support aerospace and advanced engineering SMEs to access grants and other mechanisms of support related to reducing carbon, through delivery of the Combined Authority funded **West of England Made Smarter** with a focus on the aerospace supply chain. This will include decarbonising production and promoting through wider transport planning routes to zero emissions logistics.
- Work with our industry primes to **determine gaps or needs in the future supply chain** that will support the sector to reduce carbon.

4. Nurturing talent and skills development

Develop an associated regional skills and workforce development plan, with the Heads of Skills from WECA and the West of England UAs, working alongside the Skills Advisory Panel. This will:

- Build on DETI and the Combined Authority's Workforce for the Future programme, **to develop new transferable digital engineering and green manufacturing skills** that can work across many sectors and provide a range of career pathways and opportunities for our residents.
- Develop the concept of **Digital Learning Factories** to combine our world class innovation assets with hands-on learning and skills development to inspire future careers in low carbon aerospace and advanced engineering.
- Make the case for further government investment in the region's high performing **Institute of Technology** to ensure we have the right building blocks in place to skill people to meet future industry demand.

- Provide greater opportunities for diversity and inclusion in employment by promoting the **Women in Aviation and Aerospace Charter** and a range of national and international initiatives.
- Build off the new regional **Talent Retention Platform**, led by the Combined Authority, to support activity directed at green jobs and skills in the advanced engineering and aerospace sector to enable business to business talent management, SME talent management and skills matching within and across sectors.
- Enhance digital networks and fibre broadband coverage to help increase data capacity and the ability for model-based engineering (reduced physical testing), building on programmes like UMBRELLA in South Gloucestershire.

Consultation

- 3 This position paper has drawn on the work undertaken by the aerospace sector group for the Regional Recovery Taskforce, with further advice from industry representatives and the Combined Authority funded aerospace sector specialist. More extensive engagement will take place in developing the joint plan.

Other Options Considered

- 4 N/A

Risk Management/Assessment

- 5 The main risk at this stage is associated with not taking accelerated action to decarbonise aviation and tackle the climate emergency, at the same time helping the region's aerospace sector restructure and protect jobs and skills. A full risk assessment will be included with the joint plan.

Public Sector Equality Duties

- 6 The public sector equality duty created under the Equality Act 2010 means that public authorities must have due regard to the need to:
- Eliminate unlawful discrimination, harassment and victimization and other conduct prohibited by the Act.
 - Advance equality of opportunity between people who share a protected characteristic and those who do not.
 - Foster good relations between people who share a protected characteristic and those who do not.
- 6.1 The Act explains that having due regard for advancing equality involves:
- Removing or minimizing disadvantages suffered by people due to their protected

characteristics.

- Taking steps to meet the needs of people from protected groups where these are different from the needs of other people.
- Encouraging people from protected groups to participate in public life or in other activities where their participation is disproportionately low.

6.2 The general equality duty therefore requires organisations to consider how they could positively contribute to the advancement of equality and good relations. It requires equality considerations to be reflected in the design of policies and the delivery of services, including policies, and for these issues to be kept under review.

6.3 A full equalities impact assessment will be produced alongside proposed joint plan.

Climate Change Implications

7 On 19 July 2019, the West of England Combined Authority declared a climate emergency, recognising the huge significance of climate change and its impact on the health, safety and wellbeing of the region's residents. The Combined Authority is committed to taking climate change considerations fully into account as an integral part of its governance and decision-making process.

Each report/proposal submitted for Combined Authority / Joint Committee approval is assessed in terms of the following:

Will the proposal impact positively or negatively on:

- * The emission of climate changing gases?
- * The region's resilience to the effects of climate change?
- * Consumption of non-renewable resources?
- * Pollution to land, water or air?

Particular projects will also be subject to more detailed environmental assessment/consideration as necessary as part of their detailed project-specific management arrangements

7.1 The report proposes accelerated action to decarbonise aviation and place the region at a competitive advantage in advancing new green technologies, skills and jobs. A joint plan will be developed with industry with recommended action to scale-up exiting programmes and secure new investment and delivery.

Finance Implications, including economic impact assessment where appropriate

8 *Please state any financial implications arising as a result of this report.*

Advice given by: Malcolm Coe, Director of Investment and Corporate Services

There are no direct financial implications relevant to this report.

Legal Implications

9 *Please state any legal implications arising as a result of this report.*

ITEM 9

Advice given by: Shahzia Daya, Director of Legal Services
There are no direct legal implications relevant to this report.

Appendix 1: Regional innovation assets and skills programmes supporting decarbonisation of aviation

- Launched earlier in 2021, **Airbus** has created a global **Aerospace Integration, Research and Test Centre (AIRTeC)**. Together with its suppliers, partners, and academia, it will design, test and deliver new aircraft wings, landing gear systems and fuel systems, with a focus on reducing carbon. The Filton fuel systems centre is leading essential hydrogen technology research.
- The development and commercialisation of **sustainable aviation fuels** over the next decade is vital to providing a solution to greenhouse gas emissions in flying now. Sustainable aviation fuels represent an essential near-term 'bridge' to technologies like hybrid-electric and all-electric aircraft. Hydrogen fuels are likely to be key in any decarbonisation scenario and companies such as **Airbus, GKN Aerospace** and **Rolls Royce**, based in the West of England, are helping to deliver huge technological progress.
- Opening later this year GKN Aerospace has a new **Global Technology Centre (GTC)** that will focus on additive manufacturing, advanced composites, assembly and industry 4.0 processes. GKN is also delivering a £54m collaborative H2GEAR programme to push hydrogen technology and accelerate aerospace decarbonisation to zero emissions. Entry-into-service of hydrogen-powered aircraft could be as early as 2026.
- Rolls Royce is also engaged in the development of SAFs, alongside also pioneering optimisation of industrial footprint emissions and engine electrification. The **National Composites Centre** is leading work to develop new advanced composite materials which will unlock the design potential for future, cleaner aircraft and propulsion systems.
- Bristol Airport has its own innovation fund to kick start and fast track decarbonisation initiatives in the South West, focusing on emissions from flight and transport activity. The £250,000 per annum **Aviation Carbon Transition (ACT)** Programme is open to businesses and organisations in the region, with the potential to use Bristol Airport being as a test bed location. Airport has been selected as case study for BEIS' Fly Zero and DfT's ZEFI programmes, both of which are examining the airport infrastructure requirements for hydrogen powered aircraft in the future.
- The **West of England Aerospace Forum (WEAF)** is a membership trade organisation covering all aspects of aerospace and defence. On behalf of the Aerospace Growth Partnership, WEAF deliver the National Aerospace Technology Exploitation Programme (NATEP) in the South West, aimed to help SMEs develop innovative technologies to enhance capabilities working with higher tier companies anywhere in the world.
- The **University of Bristol** is at the cutting edge of global research with a highly rated research and teaching department in areas such as hydrogen storage, electric propulsion, aeroacoustics, and control systems, and houses the Bristol Composites

Institute a world-leading institute for composites research. The **University of Bath** has a strong reputation in engineering, physical sciences, mathematics and technology and has been at the forefront of applied research into propulsion system. The **University of the West of England** offers an BEng in Aerospace Engineering and jointly hosts the Bristol Robotics Laboratory.

- The world class research and innovation facilities available at the **Institute of Advanced Automotive Propulsion Systems (IAAPs)** new £70m development located at the Bristol and Bath Science – part funded by the Combined Authority – will support collaborative opportunities in the development of drivetrain design and validation strategies and the transition to the decarbonisation of aerospace propulsion systems through future fuels and electrification technologies.
- The **National Composites Centre** is the world leading authority on composites, bringing together the best minds and the best technologies to solve the world’s most complex engineering challenges. It works globally to accelerate the adoption of high-value, sustainable engineering solutions in composites. The Combined Authority has invested £10m with industry in the **Digital Engineering, Technology & Innovation (DETI) programme aimed at creating** disruptive technology advancements to achieve net zero. DETI is also delivering a comprehensive skills and workforce development programme to inspire the next generation of engineers and to ensure the current and future workforce is digital ready.
- The West of England’s universities and further education colleges have forged strong links with the aerospace and advanced engineering sector, developing training and new facilities which are fundamental to accelerating the move to NetZero. The **West of England Institute of Technology**, funded by the Department of Education and Combined Authority, brings together our college’s, UWE, and employer partners including the leading aerospace companies and the NCC. It designs and delivers flexible, higher-level technical learning to equip people with the skills need for digital innovation and emerging green technologies.
- The **Future Technology Centre**, led by Weston College with funding from the Combined Authority, aims to up-skill learners with ‘work ready’ technology skills focused on the Creative and Digital, Advanced Engineering/Civil Engineering and Automated Manufacturing, and Low Carbon sectors.
- The Combined Authority is leading a regional **West of England Made Smarter programme** aimed at helping manufacturing businesses to digitise their processes through a number of interventions, including support to identify how to digitise, funding to purchase new machinery and the placement of skilled graduates into companies to support digitisation processes. Although not focussed on the aerospace supply chain specifically, the programme could be focussed on this sector.
- A consortium led by Atkins and involving Vertical Aerospace, Bristol Airport and the Combined Authority has been awarded an industrial research grant through the **Future of Flight Challenge** to look at the feasibility of an air taxi service in the region. The programme focuses on the development of the digital and physical infrastructure, regulation and control systems required to use these new aircraft practically and

safely. These new modes of travel will increase mobility, reduce road congestion, improve connectivity, increase UK manufacturing opportunities and help reduce the environmental impact of air travel.

The Future Flight programme is funded by £125m from the Industrial Strategy Challenge Fund which is expected to be matched by up to £175m from industry. Other regional initiatives include supporting hydrogen fuelled logistics transport between Newport and Bristol ports

- The Combined Authority's **Business Innovation Fund** is a research and development (R&D) grant fund open to SMEs, supporting their development of new products, processes and services that are relatively close to market. SMEs from a variety of sectors can apply, including those working in aerospace and advanced manufacturing. Future rounds of the fund are planned to have a clean growth focus, encouraging R&D that supports development of products, processes and services that reduce greenhouse gas emissions.
- Working with the local councils we have a well-established Inward Investment Service – **Invest Bristol and Bath** – which is leading a campaign plan to attract new investment in Sustainable Aviation and Advanced Air Mobility opportunities for the West of England. The service is already supporting 50 active inward investment leads in the sector with 50% of them specifically focused on new Net Zero and Sustainable Aviation technologies. Together with the Department of International Trade and the Heart of the South West LEP, the Combined Authority's inward investment service has developed a specific proposition on Smart and Sustainable Aviation High Potential Opportunity (HPO) that will be promoted internationally to attract inward investors.
- The Combined Authority's £8m **Workforce for the Future** programme provides support to small businesses to plan for future skills needs. A recently launched phase two, will include specialised support on developing new green skills and digital learning factories

West of England Combined Authority Contact:

Any person seeking background information relating to this item should seek the assistance of the contact officer for the meeting who is Ian Hird on 07436 600313; or by writing to West of England Combined Authority, 3 Rivergate, Temple Quay, Bristol BS1 6EW; email: democratic.services@westofengland-ca.gov.uk