

### D2N2 Investment Board – February 2021

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| Confidentiality Level | Restricted <input type="checkbox"/> | Controlled <input type="checkbox"/> | Public <input checked="" type="checkbox"/> | Commercially sensitive <input type="checkbox"/> |
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| Meeting and Date | D2N2 Investment Board – 11 <sup>th</sup> February 2021                              |  |    |
| Subject          | Project for Approval – UK Electrification of Aerospace Propulsion Facility (UKEAPF) |  |    |
| Author           | T Goshawk/ S Dancer (Amion)   | Total no of sheets (Excluding cover sheet) | 12 |

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| Papers are provided for: | Approval <input checked="" type="checkbox"/> | Discussion <input type="checkbox"/> | Information <input type="checkbox"/> |
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#### Summary and Recommendations

In July 2020, D2N2 was allocated £44.4 million from the governments Getting Building Fund towards the delivery of a range of projects across the region to stimulate economic activity and aid recovery from the impacts of Covid-19 on the region. The funding is subject to each of the 10 identified projects submitting a business case that is fully compliant with the D2N2 Local Assurance Framework (LAF).

The delivery of the fund is managed in line with the D2N2 Local Assurance Framework agreed with Government, which sets out the compliance requirements in relation to the delivery and approval of projects funded through the Getting Building Fund.

This project being put before the Investment board has now been assessed and is being recommended for consideration and approval based on its full compliance with the LAF. Following an approval D2N2 will release £7.6 Million of Getting Building Fund to the University of Nottingham.

**D2N2 Investment Board**  
**Final Business Case – Project for Decision**  
**Getting Building Fund**

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| Project Name                             | UK Electrification of Aerospace Propulsion Facility (UKEAPF)   | Project Applicant                         | University of Nottingham  |
| Construction Start Date                  | February 2021  | Construction End Date                     | January 2022  |
| Getting Building Fund Requested          | £7,600,000   | Total Project cost and Sources of funding | £16.885 Million<br><br>£9.285m from various confirmed sources (ERDF, Wolfson Foundation and University of Nottingham)           |
| Gross Value Added/<br>Benefit Cost Ratio | Benefit Cost Ratio (BCR) of between 4.4 and 5.2.<br>NPV (accounting for additionality) is between £33.6m and £39.3m<br><br>It is AMION's view that the project will represent "High Value" for money | Expected Outputs                          | £140 million worth of industrial work aligned with the facility.<br><br>300 new jobs by 2025<br><br>Support to local businesses |

### 1.0 Project Description

UK Electrification of Aerospace Propulsion Facility (UKEAPF) at the University of Nottingham is a proposed new facility to accelerate the necessary developments required for the greening of aviation. With the international agreement on climate change being implemented by governments worldwide, it is clear that aviation has to transform the way aircraft are powered to meet these commitments. The use of electrical systems, whether powered by green fuels such as hydrogen, sustainable aviation fuels or batteries, will all require rigorous testing and the facilities for doing this do not exist in the UK today. Aviation is consequently moving into a significant period of disruption and UKEAPF is required to ensure that the UK retains its status as the second largest aerospace industry in the world.

The University of Nottingham is considered the best place in the UK to house this facility as it has the world-leading expertise required to deliver the benefits to the whole supply chain. The University is home to the Power Electronics and Machines Centre (PEMC) and the Institute for Aerospace Technology (IAT), which have driven the development of power electronics, motors and drives technology over the past 20 years. This includes coordinating the EPSRC Centre for Power Electronics, hosting the Midlands Industrialisation Centre for the Driving the Electric Revolution Industrial Strategy Challenge Fund, forming the Power Electronics spoke for the Advanced Propulsion Centre and leading the Power Electronics Work Package in the EU Funded €4 billion Clean Sky 2 programme.

The £7.6 million request of Getting Building Fund capital funding will deliver the necessary equipment to incorporate into the facility. The funding will unlock a further £9.285 million of investment. The University is also providing further funding towards the development of the Power Electronics, Machines and Control building (PEMC) which will house the UKEAPF Centre.

**Assessors  
Comments**

*The project is at an advanced stage where the facility has been built and the GBF funding is required to procure and integrate the necessary equipment into the facility. The assessment of received tenders for the procurement of equipment are in progress such that the preferred provider can be selected. Therefore, the scheme is considered to be shovel ready and able to proceed subject to funding under the GBF being secured.*

**2.0 Summary of Strategic Case/Fit**

UKEAPF will be a national facility to support a green recovery for the UK aerospace industry through the development of sustainable and competitive electrified propulsion systems, part of a £1 billion vision for the East Midlands to regain its pre-eminence as the world’s foremost location for aerospace innovation that will protect the 40,000 aerospace supply-chain jobs in the region, many of which are linked to Rolls-Royce and have been impacted by the Covid-19 crisis.

The £7.6 million Getting Building Fund capital grant requested for UKEAPF will unlock a further investment of £9.285 million to establish a facility that will act as a catalyst to aid a green economic recovery for the aerospace sector and associated supply chain in the region. The project will rapidly stimulate economic activity through the development of a new generation of aerospace electrification industrial technologies and manufacturing processes co-created with local industrial partners. £140 million worth of industrial work aligned with this facility is estimated to be undertaken by March 2024, resulting in 300 new jobs by 2025.

UKEAPF investment will support economic recovery by facilitating new projects to integrate the supply chain around a common theme to ensure future business opportunities as companies cannot afford the capital expenditure which could be perceived as high-risk and otherwise would not take place. Locating the facility within the University will mean that a wide variety of companies will benefit from the investment in an environment where resources can be pooled around collaborative projects. This concept is already widely adopted within the University, where companies such as TT Electronics and Romax have set up their Advanced Technology Centres on the University's Innovation Park on Triumph Road, and Rolls-Royce has two University Technology Centres within 100 metres of the PEMC where UKEAPF will be located.

At a national level, UKEAPF will:

- Support the achievement the government's target of raising R&D investment to 2.4% of GDP by 2027.
- Contribute to both the Clean Growth and Future of Mobility Grand Challenges set out within the Industrial Strategy, supporting sustainable economic growth and the transition to a net zero economy.
- Support the emergence and development of these new technologies and assist them to come to market, decreasing congestion and increasing productivity while positioning the UK as a leader in this field. The need to move to hybrid and fully electric aircraft to transform the UK's transport market and meet its environmental targets was highlighted in the Aerospace Sector Deal has highlighted the need to move to UKEAPF.

At a D2N2 LEP level, UKEAPF will contribute to the emerging D2N2 Recovery and Growth Strategy ambition to lead the most ambitious turn-around in the country and undertake ambitious green revolution across Derbyshire and Nottinghamshire due to the high level of industrial carbon emissions within the area. Clean growth is one of three guiding principles within the LIS and the strategy sets out a series of propositions to become a next generation example of zero carbon powering, inventing and upskilling. This includes interventions to increase the use of electrified transport.

Aerospace manufacturing is an important part of the D2N2 economy. Comprising mainly of SMEs, the supply chain has been supported by the University over the past few years through European funded programmes such as Enabling Innovation (concluded in 2019) and Aerospace Unlocking Potential. These revenue programmes have focused on developing capacity within SMEs for the adoption of new technologies and processes, supporting them to move towards supporting a decarbonised aerospace industry. UKEAPF will enable them to test and develop the practical application of their innovative ideas and de-risk the commercialisation process.

Having the facility in Nottingham will retain testing activity in the UK. Currently, partners are offshoring testing work to Norway and North America due to lack of facilities in the UK.

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| <p><b>Assessors Comments</b></p> | <p><i>The rationale for the project has been clearly identified within the Business Case. The project will directly address the national Clean Growth and Future of Mobility Grand Challenges, as well as directly aligning with D2N2's objectives and the important regional aerospace manufacturing sector.</i></p> |
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### 3.0 Summary of Economic Case and expected outcomes

The BCR calculations considers the income the facility will generate. Firms have given a financial commitment indicating the proportion of testing expenditure being £140m, which the Applicant has assumed to be £35m in the next five years.

This activity projection is at the start of the R&D process of developing a new engine which will likely take over 15 years. Their product development experience and evaluations of product development programmes suggest that testing activities become more intense as development work advances. Therefore, the Applicant considers their income streams which mostly plateau at £7m (with the one at £10m) are likely to be conservative. The Applicant also states they have cautious by limiting the projections the data the firms have provided for their activity over the next five years.

Based on the Applicant's experience of working with new ventures of this kind (and undertaking project evaluations of similar types of facilities), there is usually a "start-up period". Therefore, the Applicant did not anticipate that the UKEAPF facility would undertake £7m from Year 0, rather they assumed an incremental increase in income from Years 0 - 4. These increases were estimated by the Applicant based on previous project reviews.

The Applicant's economic model assessed the sub-regional (D2N2) net income impacts of the project, applying deadweight, leakage and displacement factors of 15%, 10% and 10%, respectively. It is considered that a small proportion of the outputs are likely to occur outside of the area given the test activity will be undertaken on-site at the PEMC. Moreover, it is commented that displacement will be low because of the unique nature and technical sophistication of the facility, along with a lack of other provides (globally). An optimism bias adjustment factor of 35% has been applied to the benefits.

Overall, after the application of Additionality Factors it is estimated that there will be net sub-regional output (income) of **£33.57m to £39.31m (NPV)** over the 15-year period. These figures would provide a BCR of between **4.42 to 5.17, based purely on the D2N2 GBF application.** No sensitivity testing has occurred on these values.

This value would represent a strong value for money however, this income methodology is not deemed appropriate. Additionally, all public sector investment within total costs of the project should be included.

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| <p><b>Assessors Comments</b></p> | <p><i>AMION’s professional judgement is that this project will create substantial economic benefits through its employment creation and business support in high-value R&amp;D sectors associated with aerospace manufacturing and green technologies. The nature of these R&amp;D impacts will create strong spillover benefits across the area.</i></p> <p><i>AMION’s view is that if typical economic models and values for R&amp;D benefits were used, the overall BCR would likely represent “Very Good” value for money. In line with Green Book Guidance and BEIS Appraisal Guidance, the expected benefits would include:</i></p> <ul style="list-style-type: none"> <li>• <b>Wage premia:</b> Higher incomes in the jobs created in R&amp;D Aerospace sector;</li> <li>• <b>Productivity:</b> R&amp;D investment contributes to innovation in products and processes that result in higher levels of productivity</li> <li>• <b>Spillover effects:</b> R&amp;D and innovation generates indirect economic benefits via the utilisation of the produced knowledge by third parties (unrelated to the party who invested in the first place). For example, other firms could profit from using new knowledge or example to develop new products or processes and increase productivity.</li> <li>• R&amp;D and innovation can also have <b>non-market impacts</b> i.e. benefits and costs that are not priced in markets. For example, they may lead to improvements in population health, improvements in subjective well-being and time saving in household production activities.</li> </ul> |
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#### 4.0 Summary of Commercial Case

The Commercial Case is presented to assess the optimum means to deliver the preferred option, along with setting out delivery and procurement arrangements. The Commercial Case is summarised as follows;

**i. Market Demand and Need**

UKEAPF will contribute to the central vision of the D2N2 Recovery and Growth Strategy by supporting the transformation of the local economy away from traditional carbon-intensive industries towards “clean and green growth to power the jobs of the future”.

It will also contribute to following guiding principles and propositions set out within the Emerging Recovery and Growth Strategy:

- **Guiding Principle 1:** Lead a bold new way of bringing together the education and skills frameworks to support businesses to deliver the talent for the current and next generation of businesses – by providing a new facility around which University research will be translated into industrial products.
- **Proposition 3:** Build on the existing regional innovation assets such as the world class anchor institutions and manufacturing excellence that drive the area’s competitive advantages – by providing a new facility around which University research will be translated into industrial products.
- **Guiding Principle 2:** Lead the most ambitious carbon turn-around in the country.
- **Proposition 4:** Ensure clean growth is the golden thread running through all work across D2N2 - by providing an accessible platform around which low carbon technologies such as power electronics, machines and drive systems will be developed for industrial use.
- **Guiding Principle 3:** Deliver connectivity-led growth to all parts of the region.
- **Proposition 3:** Support the growth of cities, towns and economic corridors to improve quality of place and economic prosperity in the wider region. Ensure that housing and employment development opportunities are unlocked, and the visitor economy bolstered, to enable wider placemaking and productivity objectives – by providing employment opportunities associated with low carbon propulsion technologies.

In addition to the ERGS, the project will test, demonstrate and apply new transformative technologies that will deliver against the government’s commitment to achieving net zero carbon emissions by 2050.

The aerospace industry across the Midlands has been severely affected by the economic downturn caused by Covid-19 and UKEAPF will support its recovery by providing a unique facility that will meet the future needs of the industry and stimulate growth. Rolls-Royce is a major contributor to the region, but the drive towards zero emissions for aircraft means that their supply chain, located in D2N2, needs support to enable reorientation towards new, greener products. The investment will provide infrastructure to aid manufacture and testing of these new products aimed at electrification of aerospace components, which many of these companies produce.

## ii. Procurement Strategy

The nature of the equipment being requested requires the procurement process to follow OJEU Procurement rules. This is a process that is well understood within the University’s Procurement Department, which has established systems in place

to facilitate the publication of the Invitation to Tender and the open and transparent handling of enquiries.

The procurement process has begun through the following completed stages:

- Finalisation of requirements specification (**June 2020**)
- Preparation of Invitation to Tender documents including terms of reference (**August 2020**)
- Publication of Invitations to Tender for relevant pieces of equipment (**October 2020**)

The Applicant has identified the suppliers for the capital equipment and will confirm tenders once GBF funding has been secured from D2N2.

### **iii. Occupation of the facility**

Once the equipment has been procured and integrated in the facility, business will occupy the facility to test new technologies. There has already been demand for the facility, with £3.9m dedicated to a propulsion project that would be tested on this facility, funded through the University's Propulsion Futures Beacon of Excellence Programme.

Similarly, the occupation of the café will be by a private operator also occupying by way of a formal lease arrangement.

### **iv. State Aid**

The applicant states that the project is State Aid compliant.

Under the General Block Exemption Regulation (GBER), aid for R&D and innovation is not considered to constitute State Aid. The State Aid Manual states:

- Public funding of university and other non-profit research institutions' core teaching, research, and research dissemination activities, including the provision of infrastructure for core activities, is not State Aid. This still applies where organisations also provide economic services such as commercial research and consultancy, as long as the economic services are: necessary to or intrinsically linked to main non-economic activities; use the same inputs (material, equipment, labour and fixed capital) and do not exceed 20% of the annual capacity. The University's new PEMC building is a research and teaching facility and thus a core activity.
- Where a university / non-profit research organisation effectively collaborates in business research projects, this will not constitute State Aid provided the university / non-profit research organisation is paid market rates by business partners for its share of the work. The University states that any future economic services that are provided to businesses through the building are compliant with the above GBER requirements.



On this basis there is not deemed to be any State Aid issues arising with this project.

**Assessors  
Comments**

*The Commercial Case has demonstrated need, demand and opportunity within the D2N2 LEP area, underpinned by an identified gap for infrastructure and equipment relating to low carbon aerospace technologies.*

*In terms of the delivery of the scheme, this is now considered to be shovel ready, as only the equipment needs to be procured and this process is well progressed by the University. Quotes have been received and the selection of the preferred supplier will take place once GBF funding is agreed. The Applicant should inform D2N2 of this decision.*

*There are no expected to be any issues relating to State Aid*

**5.0 Summary of Financial Case**

The Financial Case presented primarily identifies that funding from D2N2 under the GBF will procure the necessary equipment for the facility.

The costs of the equipment have been based on initial quotations from suppliers, received as part of the initial engagement and procurement process. The status of each piece of equipment has been provided in email to D2N2.

Through the clarification process, the total project cost is £16.885m with the following funding programme and confirmations:

- **D2N2 GBF funding £7.6m.** This investment is dependent upon this Business Case and will be used to procure the high-tech equipment required for the facility.
- **Wolfson Foundation** (third sector funding): **£1.5m.** This investment is secured for the Wolfson High Power Lab within the Power Electronics and Machines Centre, where the facility will be located. A letter of confirmation has been provided to secure this funding.
- **ERDF** funded Aerospace Unlocking Potential Programme (other public funding): **£0.885m.** This investment is used to provide business support in the D2N2 LEP area.
- **University of Nottingham - £6.9m.** Through the University of Nottingham's Propulsion Futures Beacon of Excellence programme and their contributions towards the capital delivery of the PEMC. This funding has been confirmed.

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| <b>Assessors<br/>Comments</b> | <p><i>It is acknowledged that quotations for the procurement of equipment have been sent to support the business case and the process is well progressed.</i></p> <p><i>There are various sources of match-funding to support the project and they have been evidenced with letters of support from the funders.</i></p> <p><i>The University of Nottingham have provided a letter alongside the business case which accepts responsibility for any cost overruns.</i></p> |
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## 6.0 Summary of Management Case

The purpose of the Management Case is to demonstrate that robust arrangements are in place for the delivery, monitoring and evaluation of the scheme.

The UKEAPF Management Case, looked initially at Project Governance. It stated that UKEAPF will be managed by the Institute for Aerospace Technology Core Team, which oversees the University's Aerospace portfolio of live research, innovation, and technology demonstration projects worth over €70 million.

The project management team is led by a designated project manager with the appropriate qualifications in the relevant fields of study.

This was a Project Plan which listed (i) dates; (ii) milestones; and (iii) status. This was augmented by a Project Delivery Programme, which also mitigation plans in the event of the milestones not being met.

Project Monitoring and Evaluation identified fortnightly meetings of the Project Management Board that would be held to review progress and ensure the timely delivery of the project and its performance against its KPIs.

The Project Delivery Team will encompass the various departments of the University that will be performing the works to procure, install and commission the UKEAPF.

In terms of Risk Analysis, UKEAPF will implement UNOTTs Risk Management Framework, which places due emphasis on the identification and management of risks as per PRINCE 2 practices. The long-term nature of the project implies that UKEAPF will be subject to constant change within the programme and wider environment. The project's priorities and relative importance of risks will also shift and change. To effectively manage this all risks will be registered in the Risk Register.

Delivery of UKEAPF will be managed by the **Programme Manager**, who will be supported by the Technical Delivery Team. This resource is provided to the project by the University. The rigs procurement process has been defined by the University's Royal Society sponsored Entrepreneur in Residence, an individual with over 23 years of industrial experience at Rolls-Royce where he implemented technology and supply chain strategy for the improvement of its global tooling and fixturing operations and production processes.

**Assessors  
Comments**

*The aim of the Management Case within the wider Business Case is to describe how the UKEAPF proposal is achievable and can be delivered successfully to cost, time and quality.*

*The UKEAPF report looked at governance, project management team and project plan. These were covered in some detail, which clearly set out the project arrangements.*

**7.0 Sustainability and Inclusion Impacts**

One of the key impacts of this investment is its credentials in enabling sustainable innovation in the Aerospace sector. The project will work at the forefront of greening aviation and air travel for the future and directly aligns with D2N2's ambitions to lead the largest carbon turnaround in the country. Aviation as a sector is known for the environmental impact that it creates and therefore Getting Building Funding in this instance will actively be used to combat the emissions of Air travel through the creation of technologies which enable the use of more environmentally friendly fuel solutions.

The University of Nottingham will utilise the centre and the capital equipment to engage with local stakeholders such as schools and colleges through outreach programmes. It is hoped that these outreach initiatives will help to encourage uptake in STEM based subjects and interest in the field. The new centre will also enable further outreach through existing business networks to engage innovative companies in utilising the facility and collaboratively engaging with the expertise in the University.

**8.0 Officer's Recommendations**

Officers would recommend that the business case for £7,600,000 of Getting Building Fund is approved by the Investment Board as the project aligns to the Local Assurance Framework requirements and aligns strategically with D2N2's Growth Strategy. The recommendation is given with the following requirements to be met:

- *A detailed risk register is provided and updated including key risks, scoring, mitigation and individual responsible.*
- *University of Nottingham informs D2N2 LEP throughout the procurement selection process.*

### Getting Building Fund Checklist

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| <p>1. A detailed 'Green Book' compliant business case has been completed detailing the project and its alignment to the 5 case model. 'The Checklist'<sup>1</sup> published by HM Treasury is a useful one page guidance paper.</p> | <p>The project sponsor has submitted a 5-case green book compliant final Business Case to the LEP.</p>  |
| <p>2. A VFM assessment must be completed. This VFM assessment will be independently assessed by D2N2 and must show an overall score of 'High'.</p>  | <p>Amion as independent assessors of the business case have confirmed that the business case represents 'High' Value for Money.</p>   |
| <p>3. Details confirming that all planning consents have been granted and that all pre start conditions have been met.</p>  | <p>This element of the project does not require any planning permissions to proceed.</p>  |
| <p>4. Confirmation that any Section 106 or other agreements have been entered into.</p>   | <p>N/A</p>  |
| <p>5. Confirmation of the results of the procurement exercise detailing:<br/>-the tenders received (along with detailed costs)<br/>-the tender accepted (along with timescales/conditions)</p>                                      | <p>All elements of the capital equipment purchases have been procured using OJEU compliant processes which align to the universities financial regulations. These regulations have been confirmed as being compliant with public sector procurement rules and the tenders have been received for the equipment.</p> |
| <p>6. Details of the construction contract to be entered into by the promoter detailing:<br/>-start date<br/>-completion date<br/>-liquidated damages/cost over runs</p>  | <p>N/A for this phase of the project.</p>   |
| <p>7. Confirmation that the promoter will be responsible for any variations to the contract price and that once</p>   | <p>The project sponsors Chief Financial Officer has submitted a letter to the D2N2 LEP to confirm that the University of Nottingham will be responsible for any variations in costs.</p>  |

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[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/190603/Green\\_Book\\_guidance\\_checklist\\_for\\_assessing\\_business\\_cases.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/190603/Green_Book_guidance_checklist_for_assessing_business_cases.pdf)

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| entered into, the contract will be completed in line with the details submitted.   |   |
| 8. Confirmation that the project has been designed to RIBA stage 4 or its equivalent.  | N/A for this phase of the project   |
| 9. Details of any outstanding points preventing/delaying the start-up of the construction contract.  | No delays are in place  |
| 10. Details of any changes for the project from the initial EOI and OBC submissions with reasoning behind these changes. Including an updated viability report as submitted in point 5 of the OBC. | No major changes have been made to the project which affect the delivery of the project and its outcomes.   |
| 11. Confirmation that all funding is now in place with details of the sources of funding, please include letters from third party funders confirming any conditions and timescales.                | The project promoter has confirmed that all match funding for the development is in place.  |
| 12. Confirmation that all land/legal agreements have been completed and are in the control of the promoter to deliver the entire project   | N/A for this phase of the project   |
| 13. A phasing plan identifying the start and completion elements of the project along with costs associated with each phase and the outputs/outcomes that will be delivered on a quarterly basis.  | A delivery plan programme has been provided within the business case and the LEP will be able to monitor progress against anticipated milestones. |
| 14. An updated risk register identifying the key risks and the project manager responsible. The risk register needs to be scored and include a mitigation plan.                                    | An up-to-date risk register for the project has been submitted alongside mitigation measures for these risks.                                     |
| 15. The project sponsor must provide details of how this intervention will deliver on sustainability and inclusion outcomes, including through the procurement and construction of the project.    | The sustainability and inclusion impacts for the project have been included in section 7.0  |