



Department for
Business, Energy
& Industrial Strategy

Innovate UK

SBRI Government challenges.
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COMPETITION SPECIFICATION AND GUIDANCE FOR APPLICANTS DOCUMENT

Nuclear Research and Development Programme

On behalf of the
**Department of Business, Energy and Industrial
Strategy:**

COMPETITION FOR R&D ON ADVANCED MANUFACTURING AND MATERIALS

November 2016

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Section 1. Notes to Applicants

These Guidance Notes set out the background, specification, funding and guidance for applicants for the Department of Business, Energy and Industrial Strategy (BEIS) Small Business Research Initiative (SBRI) competition for the Advanced Manufacturing and Materials part of the BEIS Nuclear Research and Development Programme. The document is designed to help understand the scope, the competition process, registering for the competition, completing and submitting the Application Form and the assessment process. This document should be read in conjunction with the Application Form and the Invitation to Tender (ITT).

This is a [Small Business Research Initiative](#) competition run in partnership with Innovate UK. It is open to organisations of all types and sizes.

Small Business Research Initiative

The Small Business Research Initiative is a well established process to connect public sector challenges with innovative ideas from industry, supporting companies to generate economic growth and enabling improvement in achieving government objectives.

SBRI provides innovative solutions to challenges faced by the public sector, leading to better public services and improved efficiency and effectiveness. It generates new business opportunities for companies. It supports economic growth and enables the development of innovative products and services through the public procurement of research and development (R&D). Organisations of any size can apply.

This SBRI competition is being run by Innovate UK on behalf of BEIS

Merger of Government Departments

The former government Department for Energy and Climate Change (DECC) has now become part of BEIS. See note below in respect of any contract arising from this competition.

The contract is signed for the Secretary of State for Energy and Climate Change, as the new office of Secretary of State for Business, Energy and Industrial Strategy has yet to be constituted as a corporation sole. The rights and liabilities of the Secretary of State for Energy and Climate Change, including those under this Contract, will in due course be transferred to the Secretary of State for Business, Energy and Industrial Strategy by an Order in Council (secondary legislation) under section 2 of the Ministers of the Crown Act 1975.

Deadlines

The competition opens on 7 November. Applicants must register to apply by 12 noon on 11 January 2017 and all applications must be uploaded electronically by 12 noon 18 January 2017. See Section 7 of this document for details of how to apply.

Section 2. Introduction and Context

Nuclear power has the capability to deliver low carbon energy supplies and Government has indicated that cost effective nuclear energy can contribute to reducing the climate change impacts of energy production and use in the UK. Nuclear energy could therefore play a significant role in the UK's future energy mix. To support this aim, R&D is needed to inform, underpin and deliver Government policy on nuclear technologies.

The Nuclear Innovation and Research Advisory Board (NIRAB) has provided advice to Government on the R&D needed to deliver its civil nuclear power objectives^{1,2}. This has contributed to the development of an integrated 5 year Nuclear Innovation Programme for the UK with work grouped into six key programme areas. These six programmes areas are:

- **Advanced manufacturing and materials**
- Advanced fuels
- Reactor design – digital
- Reactor design – safety
- Recycle and waste management
- Nuclear facilities and strategic toolkit

This competition covers the area of **advanced manufacturing and materials** only.

The overall aims for the five-year integrated programme of R&D on advanced manufacturing and materials are:

- by 2020 the UK will have established a strong materials and manufacturing R&D base that is driving advanced techniques into the UK supply chain,
- by 2030 new Gen III+ and SMR plants are operating with significant UK manufactured components and assembly,
- by 2050 UK industry is a significant partner in the global deployment of Gen III+, Gen IV and SMR technologies

The programme is expected to deliver the following benefits:

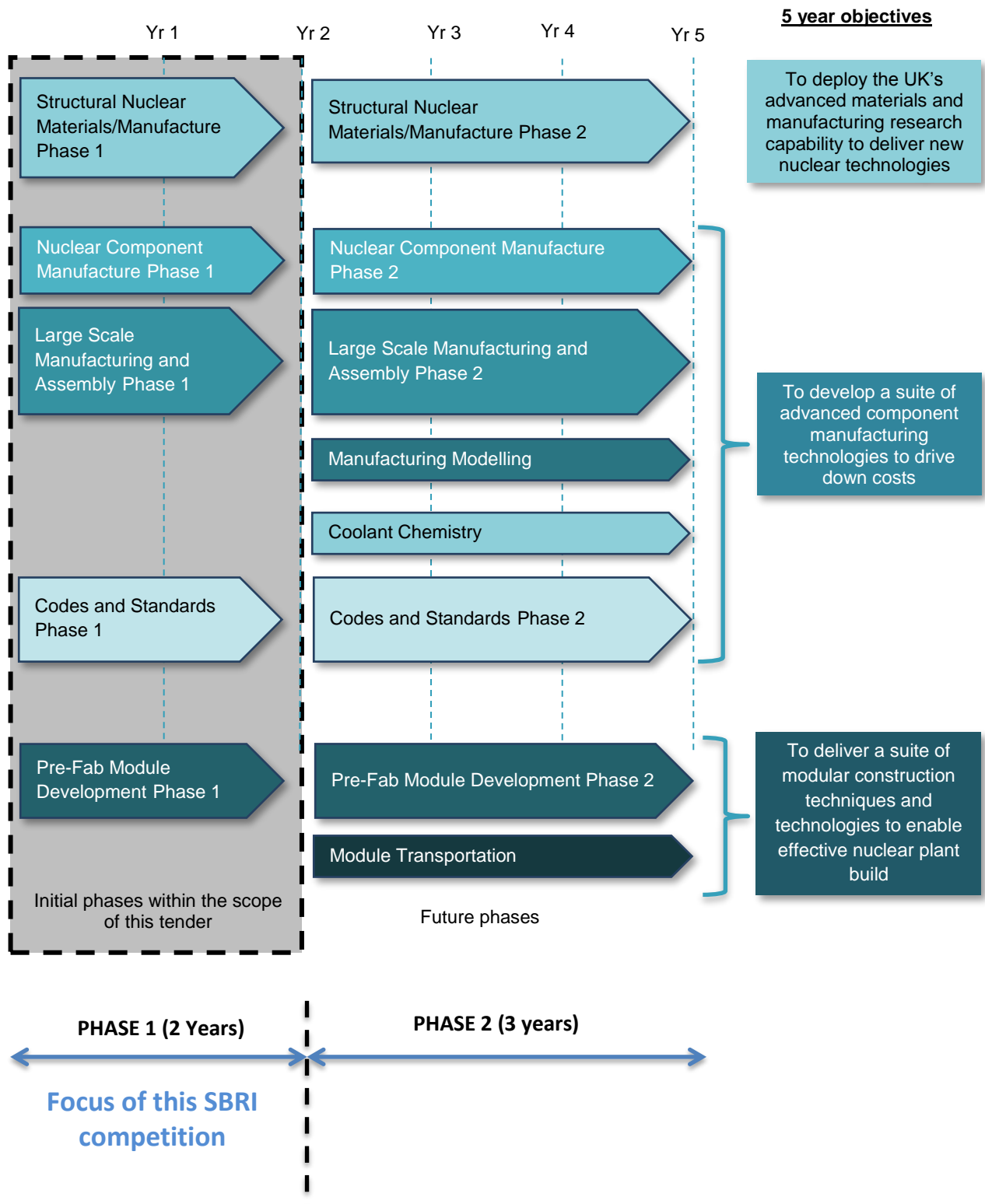
- an enhanced UK nuclear manufacturing supply chain competitiveness in the growing international nuclear market
- allow businesses to maximise the proportion of UK content in high value reactor components for future nuclear new build and SMR production
- harness the innovation qualities inherent in Small and Medium Sized Enterprises (SMEs)
- bring modular construction techniques common in other industries into nuclear projects to reduce risk and deliver improved cost and schedule certainty.

¹ [NIRAB presentation, May 2016](#)

² <http://www.nirab.org.uk/media/6233/uk-nuclear-innovation-and-research-programme-recommendations.pdf>

The five-year integrated programme of R&D on advanced materials and manufacturing is in two phases. (Phase 1 will cover years 1-2 and phase 2 will cover years 3-5). **This competition only covers the requirements of Phase 1. The launch of Phase 2 will be dependent on the outputs of Phase 1.**

The high level scope, timescales and objectives of the 5 year programme are shown in the diagram below. The hatched area indicates Phase 1 and the focus of this SBRI competition.



There are 5 themes in this competition. The themes are listed below with approximate allocated budgets shown in brackets:

1. nuclear structural materials (£1.5 million)
2. mechanisation and automation of component manufacture (£1.9 million)
3. large scale component manufacture and assembly (£1.1 million)
4. pre-fabricated module development and verification (£0.2 million)

5. design codes and standards (£0.3 million)

IMPORTANT NOTES:

1. Due to the size of the budgets across the various themes, the competition consists of **2 stages** for **themes 1 to 3** with successful applicants initially being awarded Stage 1 contracts with the potential to be awarded Stage 2 contracts on successful completion of Stage 1. For themes 4 and 5, the competition will be **single stage** with successful applicants being awarded stage 1 contracts based on their initial application form. See section 7 which describes the process for each theme.
2. This competition covers the R&D required in the first two years of a 5 year programme. For all themes, applicants should consider forward planning and how each theme will develop at the end of the initial 2 years. However, this competition must have clearly defined outputs at the end of the 2 year period.
3. Whilst there are 5 distinct themes in this competition, we expect this to be an integrated programme and expect successful applicants to work across themes to ensure that projects are coordinated and benefits maximised
4. Applications must be able to address all parts of the theme for which they are applying
5. For all themes, applicants should consider, where appropriate, the benefits of engaging internationally and the mechanisms by which they will achieve such collaborations.
6. Innovation can include the development of completely new technologies (components, techniques etc), technology transfer from other sectors, or innovative developments of existing technologies

Section 3. Key Dates

Timeline summary (fixed dates)	
Competition opens	7 November 2016
Briefing Day	17 November 2016
Registration deadline	Noon, 11 January 2017
Application deadline	Noon, 18 January 2017
Timeline summary (indicative)	
Decision to applicants	February 2017
Contracts awarded (Stage 1)	March 2017
Contract completion (Stage 1) Themes 1-3	June 2017
Contract completion (Stage 1) Themes 4 & 5	March 2018 (theme 4), March 2019 (theme 5)
Review of Stage 1 outputs ,Themes 1-3	July 2017
Contract award (Stage 2), Themes 1-3	August 2017
Contract completion (Stage 2), Themes 1-3	March 2019

Important Note: *Please do not leave your submission to the last minute.*

If any technical difficulties arise or if you identify any errors in your submission, we will not be able to grant an extension to the above deadlines. It is your responsibility to ensure you follow

the competition guidance rules and in doing so allow sufficient time to complete all of the competition requirements described in this document.

Section 4. Scope

A targeted R&D and innovation programme aimed at developing new, and transferring technologies from other sectors in the areas of: materials, manufacturing technologies, modular construction processes, codes and standards would position UK industry to take advantage of future nuclear business opportunities. All projects will be expected to contribute to one or both of the following:

- **Cost reduction** through such things as lower life cycle costs, reducing risk, more efficient technologies or processes and innovations in materials, manufacturing, construction and assembly
- **Economic growth** through such things as increased UK input into new build projects, IP generation, international collaboration including input into codes and standards

Funding is available for **pre-commercial development activities**, including feasibility studies, prototyping, field testing, trials and demonstrations. Funding is not available for commercial development activities such as quantity production.

Theme 1. Nuclear Structural Materials

Conducting work mainly at laboratory scale, projects should develop materials performance data and the fundamental understanding of materials and related manufacturing processes suitable for use in the next generation of high value components for SMRs and Gen IV reactor systems. Activities may include:

- Materials development
- Materials testing and characterisation in realistic environments
- Materials degradation studies
- Materials modelling development
- Effects of manufacturing processes

Outputs should include:

- Selection and understanding of candidate structural materials (and effects of advanced manufacturing processes) to optimise the performance of future reactors
- Advanced modelling approaches validated against experimental data, to simulate manufacturing processes and predict materials performance.
- a forward programme intended to better define the requirements of the remainder of the 5 year funding period . This should include an outline plan to deploy and commercialise the UK's advanced structural materials capability

Theme 2. Mechanisation and Automation of Nuclear Component Manufacture

Automated component manufacturing will lead to a reduction in lead times and an increase in throughput. This will help achieve the economies required to make reactors, in particular SMRs, economically viable and attractive.

Primarily focussing on introducing automated techniques from other industries or the major improvement of existing techniques to the manufacture of nuclear components, projects should identify and develop solutions that maintain component quality levels and enable codification of new techniques to nuclear standards.

Activities may include:

- Technology transfer and learning from other high value manufacturing sectors (eg aerospace, automotive)
- Development of automated joining, forming and casting techniques
- Innovative machining, manufacturing and inspection techniques
- Assessment of technology consistency and repeatability
- Targeted R&D to ensure compliance with the nuclear codes and standards.

Outputs should include:

- a. An assessment and demonstration of advanced and automated manufacturing techniques and their repeatability for high value nuclear components.
- b. Improved cost effectiveness of inspections during manufacture, of large components used in nuclear reactors during manufacture.
- c. Demonstrating compliance with existing codes and standards or a plan for the development of appropriate new codes and standards
- d. A forward programme intended to better define the requirements of the remainder of the 5 year funding period. This should include an outline plan to deploy and commercialise the outputs

Theme 3. Large Scale Nuclear Component Manufacturing and Assembly

Projects should address the challenges associated with the manufacture and assembly of large, complex, integrated nuclear components for SMRs and other key large scale nuclear components and identify technical solutions to these challenges.

Activities may include:

- Large-Scale Metrology - R&D that will monitor, address and manage the tolerance build-up across large scale components such as SMR modules during their manufacture and assembly. The ability to measure large assemblies quickly and accurately will be vital.
- Complex Machining of Large Scale Components – R&D that will address the challenges associated with precision machining of large scale components
- Integrated Unit Inspection - Inspection and measurement techniques, particularly innovative, rapid, minimally intrusive, non-destructive techniques to enable inspections during and following the integration of large complex assemblies.

- Distortion Control and Mitigation - Developing techniques to control and mitigate distortion during the machining of large nuclear components.

Outputs should include:

- a. Solutions for off-site manufacture and assembly of large scale components such as SMRs that introduces best-practice techniques into the nuclear sector.
- b. Demonstration of the development of advanced techniques for the precision machining of large, complex, integrated nuclear components such as SMR modules and large heat exchangers.
- c. Demonstration of the development of techniques for large scale metrology to measure assemblies quickly and accurately
- d. Demonstration of the development of techniques to control and mitigate distortion during the machining of large nuclear components such as SMR modules.
- e. Demonstration of the development of non-intrusive and rapid inspection and measurement techniques to enable inspections during and following the integration of large complex assemblies.
- f. A forward programme intended to better define the requirements of the remainder of the 5 year funding period. This should include an outline plan to deploy and commercialise the outputs.

Theme 4. Pre-Fabricated Module Development and Verification

Delays in on-site construction present the biggest risk of cost escalation for nuclear plant. Adopting off-site modular assembly will revolutionise the way power stations are manufactured by reducing the risks inherent in site construction, thus making nuclear more attractive to investors and lowering the cost of electricity to consumers. When integrated with design and manufacturing, modular construction will improve the delivery of major nuclear projects to time and cost.

Activities may include:

- Finding solutions to enable off-site modular construction of significant elements of nuclear facilities.
- Addressing the challenges of manufacturing, transporting and installing modules of up to 1000 Tonnes in weight.
- Underpinning R&D and verification that will support the development of large scale concrete plant modules.
- Investigate the challenges associated with large pre-fabricated nuclear structures such as providing Loss Of Cooling Accident integrity for containment boundaries.
- Developing solutions and the technical capability for modularisation of nuclear construction together with off-site inspection and verification techniques that are critical to demonstrate compliance with the relevant standards and ensure nuclear quality.

Specific outputs should include:

- a. An outline and statement of progress with the underpinning research and verification required to deliver 'plug and play' plant modules.
- b. Increased certainty of the cost and programme for constructing modular nuclear facilities, reducing risk and strengthening the case for financial investment.
- c. An assessment of the challenges associated with large pre-fabricated nuclear structures such as providing loss of coolant accident (LOCA) integrity for containment boundaries.
- d. A forward programme to identify potential off-site inspection and verification solutions to demonstrate compliance of large modules with the relevant standards and an outline plan to deploy and commercialise the programme outputs.

Theme 5. Nuclear Design Codes and Standards

Nuclear codes and standards are a critical element in the design and development of nuclear products and are agreed internationally. Projects will contribute to the formation of the codes and standards required to design and manufacture SMRs and Gen IV reactors taking account of the capabilities and experience of the UK industry. This will be achieved through a proven and recognised experience and knowledge of nuclear codes and practices

Activities may include:

- Knowledge capture
- Active UK membership of the relevant bodies responsible for the development and promulgation of codes and standards e.g. ASME.
- Building on capabilities and experience of UK industry and contribute to the formation of codes and standards for the design and manufacture of SMRs and Gen IV reactors.

Specific outputs should include:

- a. A strategy for codifying new design, manufacturing, construction and operational techniques relevant to SMR and Gen IV reactor concepts.
- b. UK Engagement with International Codes and Standards Committees to influence the adoption of new requirements.
- c. Produce guidance for UK industry on the code requirements to maximise the business opportunities new nuclear provides.
- d. A forward programme intended to better define the long term requirements of codes and standards and the UK's role in their scoping and definition.

Note: Although this is a separate package of work, developments arising from the other areas may impact on Design Codes and Standards. In that event, tenderers should include any arising consequences for Design Codes and Standards in their work package, irrespective of whether they are bidding for the Design Codes and Standards work package.

Section 5. Funding

The Department for Business, Energy and Industrial Strategy (BEIS) is to invest up to £5 million

(excluding VAT) in projects to develop innovative manufacturing and materials technologies for the civil nuclear sector, focussing on Gen IV and Small Modular Reactor (SMR) technologies.

The indicative funding available for the scope of work in this competition is approximately as follows (**all figures exclude VAT**):

Theme	Maximum budget (£m) (excluding VAT)
1. Structural Materials (stage 1+2)	1.5
2. Mechanisation and Automation of Nuclear Component Manufacture (stage 1+2)	1.9
3. Large Scale Manufacturing and Assembly (stage 1+2)	1.1
4. Pre-fabricated module development (stage 1 only)	0.2
5. Nuclear Design Codes and Standards (stage 1 only)	0.3

Up to £800,000 has been allocated for stage 1 projects. Stage 1 contracts for technical feasibility studies in themes 1 to 3 will be worth up to £25,000. Stage 1 contracts for theme 4 projects will be worth up to £200,000 and contracts for theme 5 projects will be worth up to £300,000.

For projects in themes 1 to 3, we have allocated up to a total of £4.2 million for stage 2.

Section 6. Eligibility Criteria

SBRI is aimed at organisations working on research and development (R&D) of an innovative process, material, device, product or service *prior to commercialisation*. Funding is available for R&D activities only. Projects requesting funding for commercialisation activities are not eligible.

SBRI competitions are ***open to all organisations*** that can demonstrate a route to market for their solution.

The sharing of *risks and benefits* is an important aspect to the SBRI approach. Projects receive financial support and retain any intellectual property generated, with certain rights of use retained by BEIS. Project outputs are expected to be shared publicly.

Eligible proposals must:

1. Be at a pre-commercial stage of development
2. Address the call scope within the theme for which they are applying

3. Describe all stages (1 and 2) of the project, where applicable
4. Be led by a single organisation with evidence of strong collaboration by the use of sub contractors across the supply chain. Engagement with SMEs is particularly encouraged.
5. Request no more than 50% for capital equipment

Section 7: Competition process

SBRI competitions normally follow a 2 stage process.

Stage 1: Technical feasibility study: The output of this will typically include a report detailing the design, operation and benefits of the technologies. The report must provide a detailed technology and project plan and potential route to market.

Stage 2: R&D development contract. The deliverables of this will be the execution of the technology plan delivered in Phase 1 and may include experimentation, trials and validation of the technology and a full report detailing the results of the development and trials including exploitation plans and route to market. Recommended further work should also be included

NOTE: Due to the size of the budgets and technology areas across the various themes, the competition consists of **2 stages** for **themes 1 to 3** with successful applicants initially being awarded Stage 1 contracts with the potential to be awarded Stage 2 contracts on completion of Stage 1. For **themes 4 and 5**, the competition will be **single stage** with successful applicants being awarded stage 1 contracts based on their initial application form.

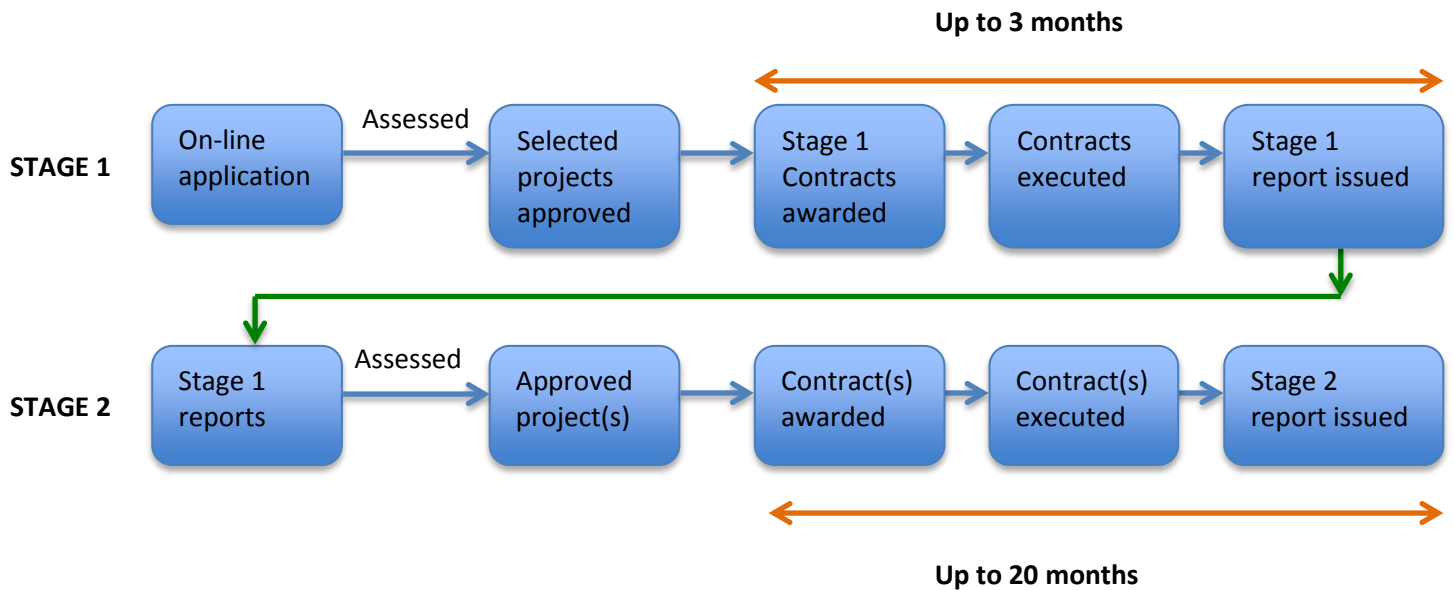
All applicants must firstly complete an initial application form (described in this document) as these applications are independently assessed and form the basis on which applicants are awarded Stage 1 contracts.

For themes 1-3, it is possible that a number of projects could be awarded Stage 1 contracts in each theme based on the quality of their application. The duration of Stage 1 for these themes is up to 3 months. The outputs of Stage 1 will then be assessed and a Stage 2 contract(s) awarded to the best project(s) in each theme to execute the development contract. Only applicants who have been awarded Stage 1 contracts will be eligible for a Stage 2 contract. Stage 2 contracts can be up to 20 months.

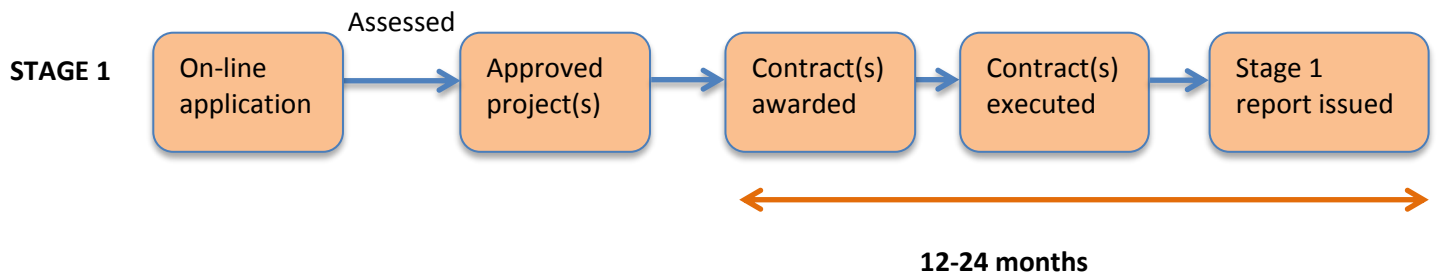
For themes 4 & 5 it is likely that only one Stage 1 contract will be awarded in each theme based on the quality of their initial application form. The duration of Stage 1 for these themes is up to 12 months for theme 4 and 24 months for theme 5.

A schematic of the application process, timescales and stages for themes 1-3 and themes 4 and 5 is illustrated below:

Themes 1-3, two stage process



Themes 4 & 5, Single stage process



Note: Whilst there are 5 distinct themes in this competition, we expect this to be an integrated programme and expect successful applicants to work across themes to ensure that projects are coordinated and benefits maximised

Section 7a. How to Apply



REGISTER

To enter this competition, the lead contractor for the project must register via the [competition webpage](#) after the competition opens on **7 November 2016**

When you click on 'register and apply' you will be taken to the _connect login page. _Connect is Innovate UK's online open innovation network of networks and is being used to host the first stage of the application process for this competition. If you do not already have a _connect account, please create one by following the 'register' link.

Please note that once you have signed into _connect you will be taken back to the competition webpage, where you should click on 'register and apply' again, in order to begin your application.

You will receive an email acknowledgement of your registration within 48 hours containing a username and password for our secure upload facility, along with a unique application form and number.

Please note: The last date to register for the competition is noon 7 days prior to the close date.

Multiple project applications

Applicants can apply for as many themes as they want to. However, applicants (with or without subcontractors) must be able to cover **the full scope** of the theme they are applying for. Applications covering only part of the scope of a theme will be deemed out of scope.

If you wish to apply for funding for more than one theme, you must register once and then request additional application forms by emailing an additional registration request to support@innovateuk.gov.uk. You will then be able to make separate submissions by completing a unique application form for each separate theme, ensuring the appropriate application form is uploaded to the site under the correct application number.



DOWNLOAD documents

Once you have received your unique username and password, you can log into the secure website to access additional documentation relevant to the competition. For this competition these are:

- Invitation to Tender
- Competition Brief (URL site)
- Application form and Appendices
- Specification and Guidance for applicants (This document)

Important note: when registering, please do not copy and paste your password into the website as the site will not allow this. You will need to manually enter the password from the email sent to you by the competitions team.



COMPLETE documents

- The application form should be completed and submitted as directed using the information in this document.
- You must also submit supporting appendices as referred to at section Section 7d of this document.



UPLOAD documents

Please ensure that you allow plenty of time to upload your completed documents for submission to the competition. Our submission close dates can be very busy which means that file uploads can take some time. We recommend that you upload your application in plenty of time as the deadline is final.

To upload your application documents, log on to the secure website using the details supplied with your secure username and password.

You will be able to see that your application and any supporting appendices have been successfully uploaded as the documents will be visible to you in the Upload folder of your secure website. The file size of each document should be the same as the original documents before you uploaded them.

NOTE: Only successful applicants being offered a contract will be asked to submit additional forms metioned in the ITT, listed below. However all applicants must tick the appropriate box on the application form saying they have read and comply with the following declarations

- Declaration 1: Statement of non-collusion
- Declaration 2: Form of Tender
- Declaration 3: Conflict of Interest
- Declaration 4: Questions for Tenderers
- Declaration 5: Code of Practice



**NOTIFICATION
received**

Once the competition submission deadline is reached, your application is sent for assessment. Once the assessment process is complete, we will notify you of the outcome of your application as soon as possible

Notification is sent by email and is sent to the main contact's email address entered in your application form.



**FEEDBACK
received**

You will be able to access feedback on your application from the assessors by logging into the secure site.

We will give feedback to unsuccessful applicants approximately 4 weeks after you have been notified of the decision. The lead applicant can access the feedback by logging on to the secure website where you uploaded your application documents. It is the responsibility of the lead partner to communicate the feedback to any sub contractors. No additional feedback can be provided and there will be no further discussion on the application.

Section 7b. Guidance on Completing the Application Form

This section explains the structure of the application form and offers guidance on the information to include in each section. These notes should be read in conjunction with the application form and the Invitation to Tender and are designed to help you to provide the information required.

It is important that you address and respond to each question clearly. To help you, the guidance below and the evaluation criteria (Section 8) provides an explanation of what is required for each question. The guidance notes and assessment criteria are not intended to be exhaustive; you should develop your own responses and structure them based on your own skills, knowledge and experience that you believe will make the most compelling case for support.

When completing the application form it is important to take into account that the limited space provided is to enable you to give a specific amount of information for each question. You are encouraged, therefore, to optimise the use of the available space and any appendices at your disposal.

Keep the use of acronyms to a minimum. Only use acronyms where a term is mentioned frequently throughout the proposal. If you do choose to use an acronym, do not assume that the reader knows what it means and be sure to define it.

IMPORTANT NOTE:

For themes 1-3, when answering the questions you should provide sufficient information about your proposal for 2 years ie Stages 1 and 2 of this competition, such that assessors can judge the

innovation of your proposal and the ability to deliver the development programme as well as a feasibility study.

For themes 4 and 5, as there is no Stage 2, your focus should be on what and how you will deliver Stage 1, but indicate what further work will be required to implement or get the technologies to market and the timescales associated with them.

Section 7c. The Application Form

Please ensure that you upload the final and complete version of your application by the deadline. It is your sole responsibility to ensure you upload the application form intended for submission and assessment and not a blank or incomplete application form.

Important: Please note the following process requirements for the application form:

- You may only use the application form provided. It contains specific information including a unique reference number for your project.
- The application form contains specific fields and it is important that you complete each field and present a fully completed form. **Incomplete forms will be rejected.**
- The application form must not be altered, converted or saved as a different version of Microsoft Word.
- The space provided in each field of the form is fixed and you must restrict the content of your responses in each of the fields to the space provided. The typeface, font size and colour are predetermined and cannot be changed. Illustrations and graphics cannot be included in the application form, only in Appendices. Please check your completed application form in PRINT VIEW: any text that can't be seen in this view or when the form is printed will not be assessed.
- The light grey shaded fields are completed automatically from other information entered on the form, e.g, the total columns of a table. These cannot be overwritten.

1. Application details

Field	Guidance
Project Title	Please provide the title for the project. This should be both clearly descriptive and concise. It should contain keywords relevant to the project
Project Duration	Indicate the duration of your Stage 1 project
Total Contract Cost (£s)	Enter only the contract cost of the Stage 1 feasibility study (see section 5 for range of costs)
Proposed Start Date	Please provide your proposed start date for Stage 1
Theme	Please select from the drop down menu the theme for which you are applying
Type of innovation	Please select the type of innovation from the drop down menu
2. Details of Lead Applicant Organisation	

Lead Applicant Details	Please submit the Company name, and other details as requested on the Application Form.
3. Contact Details	
Contact Details	Please submit the lead applicant's name, and details. Lead applicants are expected to have discussed their proposals with their own company or any other body whose co-operation will be required in the conduct of the project, before submitting applications. By submitting the application you are confirming that the information given, in this application, is complete and that you are actively engaged in this project and responsible for its overall management and agree to administer the award if made.

4. Title and Abstract for Publication (mandatory, not scored)	
Question	Guidance
If your application is successful, we may publish the following brief description of your proposal. Provision of this description is mandatory but will not be assessed.	<p>Please provide a short description of your proposal (this should cover an outline of <u>both</u> Stage 1 and 2 for themes 1-3, and just Stage 1 for themes 4 & 5) in a way that will be comprehensible to the general public. Do not include any commercially confidential information, for example intellectual property or patent details, in this summary.</p> <p>We reserve the right to amend the description before publication if necessary, but will consult you about any changes.</p> <p>Whilst this section is not assessed, provision of this public description is mandatory. Funding will not be provided to successful projects without this.</p>
5. Gateway Question: Scope (mandatory, not scored)	
Question	Guidance
How does your proposal fully address all elements of the scope identified in the theme for which you are applying	Clearly explain how your proposal fits within the scope of the competition and how it addresses <u>all</u> elements of the theme you are applying for. Projects will be deemed out of scope if all elements are not addressed.

Questions 6-9 (mandatory, scored)	PLEASE NOTE YOU WILL ONLY BE SCORED ON THESE QUESTIONS AND THE SUPPORTING INFORMATION YOU SUPPLY IN THE APPENDICES
Question	Guidance

<p>6. Methodology (up to 2 pages + Appendix A)</p> <p>What approach will you take and where will the focus of the research/innovation be that will ultimately lead to deployment?</p>	<p>NOTE- ALL REFERENCES TO STAGE 2 ARE ONLY APPLICABLE TO APPLICANTS APPLYING FOR THEMES 1-3</p> <p>You should bear in mind the points highlighted in the evaluation criteria in Section 8.</p> <p>To assist in providing clarity to the assessors, you can break the answer down into sub-sections by the use of numbering and relevant subheadings, that you feel are most appropriate (eg 1. BACKGROUND, 2. WORK PACKAGE DESCRIPTION, etc)</p> <p>Avoiding the use of unnecessary technical jargon, describe clearly how the proposed project will deliver the outcomes as described in the competition documentation and how it is innovative. Detail the methodologies, the innovation and likely outputs. Quantify any benefits. Do not just reiterate what is in the specification document</p> <p>For themes 1-3, indicate what you will do both in Stage 1 and the main elements of Stage 2 of the project</p> <p>Appendix A (2 pages) can be used to include additional information that strongly supports the methodology. This should not be used simply as an extension to the main application, but should provide additional information that provides clarity and evidence to support your application. This can be in the form of text, images or graphics as appropriate</p>
<p>7. Team and resources (up to 2 pages + Appendix B)</p> <p>Who is in the project team and what are their roles, expertise and track record?</p>	<p>You should bear in mind the points highlighted in the evaluation criteria in Section 8</p> <p>We expect that as the lead contractor you will be able to name the main subcontractors that will be used on the project. It would be expected that the subcontractors would have engagement in both Stage 1 and Stage 2 of the project (for themes 1-3). The assessors must have confidence that the project team has all the correct skills and expertise to deliver <u>every</u> aspect of this theme both in Stage 1 and 2 (for themes 1-3)</p> <p>Appendix B (2 pages) should be used to include brief cv's indicating the experience and skills of key team members in the context of this project</p>

<p>8. Project management and risks (up to 2 pages + Appendix C)</p> <p>What is your project plan, how will you manage the project effectively and what are the main risks?</p>	<p>You should bear in mind the points highlighted in the evaluation criteria in Section 8</p> <p>You must demonstrate that there is a clear project and management plan which will enable the resources, including manpower, equipment and materials to be used in a way that will produce the highest quality outputs for both Stages 1 and 2 . This should include your plan for reporting of results. It should also include how you intend to work with other Theme leaders.</p> <p>Complete the milestone register in the application form. Please describe the key project milestones for Stages 1 and 2 (as appropriate) in the space provided. For Themes 1-3 please give only <u>1 milestone for Stage 1</u>, use other milestones for Stage 2. For Themes 4 & 5 all milestones should refer <u>to milestones for Stage 1 only</u></p> <p>Appendix C (3 pages) should be used to provide the following supporting information for this section</p> <ul style="list-style-type: none"> • A risk register and mitigation plan for Stages 1 & 2 • A detailed project plan for Stage 1 • A high level project plan for Stage 2
<p>9. Cost and value for money (2 pages + Appendix D)</p> <p>How much will the project cost and how does it represent value for money?</p>	<p>You should bear in mind the points highlighted in the evaluation criteria in Section 8</p> <p>Please note the Assessors are required to judge the application finances, in terms of value for money i.e. does the proposed cost for effort and deliverables reflect a fair market price?</p> <p>Applicants are instructed that the costs quoted must reflect actual costs at a “fair market value”.</p> <p>Costs must be justified. Try and do this on a Work Package basis. If there is significant use of subcontractors, please explain how these will be used and the costs of each.</p> <p>Please provide a summary of <u>your fixed price offer</u> for Stage 1 in Appendix D.1. For themes 1-3, also provide a summary of <u>estimated</u> costs for Stage 2 in Appendix D.2</p> <p>ELIGIBLE COSTS: Below is a list of eligible costs.</p> <p>Directly Incurred Costs:</p> <p>These are costs that are specific to the project that can be charged to the project as the amount actually spent. They comprise:</p> <ul style="list-style-type: none"> • Labour costs for all those contributing to the project broken down by individual • Material Costs (inc consumables specific to the project)

	<ul style="list-style-type: none"> • Capital Equipment Costs (no more than 50% of contract value) • Sub-contract costs • Travel and subsistence <p>Indirect Costs: Indirect costs should be charged in proportion to the amount of effort deployed on the project. Applicants should calculate them, using their own cost rates. They may include:-</p> <ul style="list-style-type: none"> • General office and basic laboratory consumables • Library services/learning resources • Typing/secretarial • Finance, personnel, public relations and departmental services • Central and distributed computing • Cost of capital employed • Overheads <p>Itemisation of costs and methods of calculation may be requested to support the application at a later date and may be audited.</p> <p>INELIGIBLE COSTS Under no circumstances can costs for the following items be claimed:</p> <ul style="list-style-type: none"> • Commercialisation activities • Protection of IPR • For activities of a political or exclusively religious nature; • In respect of costs reimbursed or to be reimbursed by funding from other public authorities or from the private sector; • In connection with the receipt of contributions in kind (a contribution in goods or services as opposed to money); • To cover interest payments (including service charge payments for finance leases); • For the giving of gifts to individuals, other than promotional items with a value no more than £10 a year to any one individual; • For entertaining (entertaining for this purpose means anything that would be a taxable benefit to the person being entertained, according to current UK tax regulations); • To pay statutory fines, criminal fines or penalties
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10. Declarations (mandatory)

The lead applicant is expected to have discussed the application within their own company and any other body whose co-operation will be required to deliver the project.

The lead applicant will need to obtain consent from an authorised officer or appropriate signatory who will sign the contract if successful; we will provide a contract for review. The contract is a legally binding document and subject to the outcome of this competition.

By submitting the application you are confirming that the information given, in this application, is complete and accurate and that you are actively engaged in this project and responsible for its overall management and agree to administer the contract if awarded. You are also confirming that you have read, understood and agree to the relevant explanatory materials, Terms and Conditions and Declarations in the Invitation to Tender and these Guidance Notes

Section 7d: Project Appendices

Appendices are submitted with the application form as indicated in this section and on the Application form. It is important to note that these are intended to contain supporting information and not substantive elements of answers to the application form questions. Do not, therefore, use the appendices as an overflow to the application form.

In order that assessors can open and read the appendices, each appendix must:

- conform to the maximum length specifications listed below
- be submitted in Portable Document Format (.pdf)
- be legible at 100% zoom/magnification
- display prominently the 'Project title' as entered on page 1 of the application form
- be named appropriately with your unique project number and Appendix number.

If you submit appendices longer than specified below, they will be truncated and the excess discarded.

Appendices may be printed or photocopied in black and white, so colour should not be used as the sole method of conveying important information.

Appendix	Guidance
Appendix A Up to 2 sides of A4 PDF format	Use Appendix A to include additional information that strongly supports the proposed methodology. This can include images, graphics and text but should not repeat what you have already included in the main application or simply be used as an extension of it.
Appendix B Up to 2 sides of A4 PDF format	Use Appendix B to include brief cv's indicating the relevant experience and skills of key team members in the context of this project for Stages 1 and 2 where applicable.
Appendix C Up to 3 sides of A4 PDF format	Use Appendix C to present a risk register and mitigation plan for stages 1 & 2 and project plans for both stages
Appendix D.1 & D.2 (2 pages)	Complete the Cost Table in Appendix D.1 for stage 1

Set Finance form	Complete the Cost Table in Appendix D.2 for stage 2 where appropriate
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Section 8. Evaluation criteria

A minimum of 3 external, independent experts will assess the quality of your application using the criteria described in Section 9. BEIS reserves the right to:

- a. invite applicants to attend an interview
- b. adopt a portfolio approach to ensure projects:
 - are high quality
 - reflect the range of themes as described in the scope
 - may have additional knock-on benefits for other sectors
 - reflect the potential for short, medium and long term return on investment for the company and the UK

Applications will be evaluated according to the following 4 criteria in the Application Form:

- 1) Methodology/Innovation
- 2) Team and resources
- 3) Project management and risks
- 4) Cost and value for money

Examples of what might be considered in your response are given in the Table below:

Question	What might be included: NB the list is not intended to be exhaustive	Weighting
6. Methodology You must: Demonstrate what is innovative about the proposal , the methodology you will use to deliver and its benefits and route to market	<ul style="list-style-type: none"> • why, in your view, is this challenge important? • how do you propose to address the need identified and the objectives and outputs stated in the scope? • how will it improve on the current state-of-the-art ? • describe the proposed solution(s) and the focus of the research/innovation in the project (e.g. technology transfer, incremental development of existing technologies or a totally disruptive approach). Do you have freedom to operate? • what is the nature of the outputs you expect to deliver from the project? How will you disseminate and exploit them? What is your route to market? • can you quantify the potential for cost reduction, efficiency improvements etc.? • who are the target customers and/or end users? • outline the likely future stages of development and timescales needed to take the research/innovation outputs to deployment beyond Stages 1 and 2. 	X 4

Question	What might be included: NB the list is not intended to be exhaustive	Weighting
<p>7. Team and resources</p> <p>You must : Demonstrate that the partners have the right skills, experience and capacity to deliver the project.</p>	<ul style="list-style-type: none"> • what are the roles, skills and relevant experience of the lead contractor and all sub-contractors in the team in relation to the approach to be taken and why are they best placed to execute the project? • what resources (including materials, equipment and facilities) are required for the project and how will you ensure access to them? • describe any existing relationships between the project team and how these might beneficially develop as a result of the project • how will you address any skill/resource gaps that may emerge as the project progresses? • highlight any relationships with SMEs in the project (particularly new relations) • show have you considered how international engagement could deliver better outputs for the project 	<p>X 3</p>
<p>8. Project management and risks</p> <p>You must: Demonstrate a clear project management and risk management strategy</p>	<ul style="list-style-type: none"> • describe the content of the main work packages of the project, who will lead them, and the estimated cost of each one • describe your approach to project management, identifying any key tools and mechanisms that will be used to ensure successful project delivery and management reporting lines • highlight your approach to managing the most innovative aspects of the project • outline your project plan in sufficient detail to identify any links or dependencies between work packages or milestones • identify the key risks and uncertainties of the project and how they will be mitigated • to ensure an integrated programme, how will you liaise with other contractors who are leading other themes? 	<p>X 2</p>

Question	What might be included: NB the list is not intended to be exhaustive	Weighting
9. Cost and value for money You must: Demonstrate clear value for money	<ul style="list-style-type: none"> justify the total project cost (stage 1 and 2) and how it represents fair market value justify any sub-contractor costs and why they are critical to the project justify in detail how your project represents value for money indicate any additional funding being applied to the project, either from the suppliers or third parties that increases value for money 	X 1

Section 9. Scoring Methodology

Applications will be scored against each of the criteria above, according to the extent to which they meet the requirements of the competition.

Marks between 1-10 will be awarded by the assessors for each question. The total score of each assessor will be calculated by applying the weighting set against each criterion, outlined above; the maximum number of marks possible will be 100. The final score will be the average calculated across all assessors. Should any applicant have a final averaged of score 1 in any of the criteria, they will be excluded from the competition.

Indications of the criteria that assessors will be scoring against (on a scale of 1-10) for each of the marked questions are given in the Table below. The assessor will view these in relation to the topic of the specific questions and how well the applicants have addressed the criteria within each question.

SCORE	GENERAL SCORING CRITERIA
1	There is no evidence that the question has been answered, leaving the assessors with no confidence in the project in this area
2-3	There is very little evidence that the question has been satisfactorily answered and major omissions are evident, leaving major doubts in the assessors minds
4-5	There is little evidence that the question has been satisfactorily answered and some omissions are evident. Much more clarification is needed, leaving clear doubt in the assessors minds
6-7	There is reasonable evidence that the question has been satisfactorily addressed but some omissions are still evident and further clarification is needed
8-9	The question has been well addressed with a good evidence base, with only minor omissions or lack of clarity, giving confidence to the assessor.
10	There is clear evidence that the question has been completely addressed in all aspects, with question answered clearly, concisely with a strong evidence base leaving no doubt in the assessors minds

Section 10. Project Deliverables

This Table below indicates the types of outputs expected from the different stages of the competition. The list is not exhaustive and contractors are expected to provide outputs that will provide innovative solutions to the challenges of the competition.

Stage	Outputs
Stage 1-(themes 1-3 only) Technical Feasibility	<p>A detailed report (30-40 pages) that will form the basis of the proposed work for Stage 2. The report might include such things as:</p> <ul style="list-style-type: none"> • analysis of the market, the business opportunity the technology will create and its potential route to market • full details of project management, risks, the role of all partners and how the project will interact with other Themes • cross sector collaboration and technology transfer • a convincing argument as to the feasibility of your ideas and technologies • explanation of the innovation and how it will benefit the sector • a detailed description of the technology and detail of how it will be developed in Stage 2 • a detailed technology and project plan for the next ~2 years for Stage 2 with a vision of how the technology could be demonstrated at a pilot or pre-commercial level in the most realistic timescales • a detailed cost and resource breakdown to carry out Stage 2
Stage 2 (for themes 1-3) R&D development programme	<ul style="list-style-type: none"> • quarterly progress reports • delivery and reporting of the programme described in your Stage 1 feasibility report. This will involve significant experimental development and pre-commercial R&D • a detailed plan and costings for any potential Phase 2 follow-on programme in 2 years time • final report and exploitation plan
Stage 1 (for themes 4 & 5 only)	<ul style="list-style-type: none"> • quarterly progress reports • a detailed final report (~50 pages) detailing the delivery of all aspects of the programme described in your original application form • a detailed plan and costings for any potential follow-on programme

Section 11. How to find out more

Questions and comments are very welcome while the competition is open. Questions on the challenges and scope of this competition should be addressed to support@innovateuk.gov.uk

For any queries relating to how to submit your application, please contact Innovate UK's Customer Support Services on:

E-mail: support@innovateuk.gov.uk

Tel: 0300 321 4357

Section 12. What we do with your personal data

Innovate UK complies with the requirements of the Data Protection Act 1998 and is committed to upholding the data protection principles, and protecting your information.

The Information Commissioner's Office also has a useful guide, for organisations, which outlines the data protection principles. The link to this guide can be found here: <https://ico.org.uk/for-organisations/guide-to-data-protection/>

Annex A. Benefits Realisation and post project Evaluation

Performance, Evaluation and Benefits Evidence

1. Introduction

BEIS requires project and programmes to be subject to evaluation as part of its governance process and to establish the benefits of public funding. This section aims to give an indication of the requirements so that applicantss can allow for the costs in their tender.

2. Performance

The supplier will report regularly, and at least quarterly, on KPIs, progress, risk and budget. Informal weekly updates may also be required, with more formal monthly updates provided for further distribution as required.

The supplier will present final outcomes to appropriate stakeholders as required by BEIS, and supply assurance and evaluation reports in BEIS standard templates.

3. Evaluation

The following KPIs highlighted in yellow have been identified for this programme on advanced manufacturing and materials:

Objective	Benefit	
	Increased nuclear contribution to UK energy mix	

Ensure the UK has a secure and resilient energy system	Continued operation of existing sites	
	Improved public acceptance of nuclear generation	
	Improved safety in new designs	
	Intelligent customer	
	Volume and breadth of skilled resource	
	Reduced nuclear waste disposal requirements	
	Regulatory capability (knowledge and capacity)	
	Evidence-based policy	
	Improved linkage between academia, industry and regulator)	
	Improved nuclear fuels (resilience, cost and proliferation resistance)	
Keep energy bills as low as possible	Continued operation of existing sites	
	Increased nuclear contribution to UK energy mix	
	Evidence-based policy	
	Improved nuclear fuels (resilience, cost and proliferation resistance)	
	Improved linkage between academia, industry and regulator)	
Secure ambitious international action on climate change while reducing carbon emissions cost-effectively at home	Increased nuclear contribution to UK energy mix	
	Continued operation of existing sites	
	Improved public acceptance of nuclear generation	
	UK Intellectual Property	
	More rapid construction of next generation of Nuclear	
	Evidence-based policy	
Manage the UK's energy legacy safely and responsibly	Improved management of plutonium stockpile	
	Reduced nuclear waste disposal requirements	
	Improved nuclear fuels (resilience, cost and proliferation resistance)	
	Improved linkage between academia, industry and regulator	

Metrics to enable monitoring of the KPIs have been developed as follows:

KPI	Metrics
Technical objectives met	<ul style="list-style-type: none"> • Milestones achieved
Knowledge/IP Generation	<ul style="list-style-type: none"> • Number publications / citations • Number of FTEs engaged in new R&D programmes • Number of patents
International collaborations	<ul style="list-style-type: none"> • Joint programmes identified • Government agreements in place • Number of international collaborations in programme • Financial leverage - international
End user engagement in programme	<ul style="list-style-type: none"> • Number of projects with end user effort • Financial leverage from industry
UK influence to international programmes	<ul style="list-style-type: none"> • UK representation on international R&D committees / boards • Number of international programmes engaged in UK priority R&D

R&D/innovation transfer to industry	<ul style="list-style-type: none"> • Industry FTE engaged in R&D programmes • Number of technology transfer agreements in place • Number of new processes being certified • Number of non-nuclear / new entrant companies engaged in research programme
SME engagement in R&D	<ul style="list-style-type: none"> • Number of SMEs engaged in programme
Coordination across multiple organisations on R&D theme	<ul style="list-style-type: none"> • Number of organisations involved in coordination meetings / virtual hubs • Number of joint R&D programmes
Coordinated facility access	<ul style="list-style-type: none"> • Number of organisations accessing facilities for nuclear R&D • Third party utilisation of facilities • Overall utilisation of key facilities
Knowledge transfer	<ul style="list-style-type: none"> • Number of new researchers engaged in formal knowledge transfer activities • Number of dissemination events • Number times databank accessed

In addition to the above KPIs and metrics, a standardised project evaluation and benefits process is being developed to apply across the Energy Innovation Portfolio. Additional evaluation criteria and Key performance indicators are likely to include:

- Expansion of the Low Carbon Economy
- Level of Low Carbon Investment
- Level of Innovation
- Accelerating Diffusion
- Energy Security
- Cost Reduction
- Reductions in CO2 emission

4. Benefits

In the case of novel technology development, benefits will only be realised fully if the technologies developed are commercialised. To encourage exploitation and commercialisation, there will be a requirement for applicants to demonstrate the exploitation route clearly, with evidence of buy-in by the end user. This approach enables open competition whilst providing assurance of benefits realisation.

IP will be managed in a manner that enables BEIS to re-allocate / licence IP if it is not being exploited / commercialised effectively. See terms and conditions in Invitation to tender document