# Artificial intelligence research to enable UK’s net zero target

Apply for funding for research into the use of artificial intelligence (AI) in addressing net zero challenges across 4 themes:

* energy
* transport
* environment
* agricultural and food systems

Projects may use current AI or develop and apply new AI capabilities to address net zero challenges.

You must be based at an eligible UK research organisation.

Projects must be interdisciplinary, with research across at least 2 research councils remits.

UK Research and Innovation (UKRI) will fund up to £2,500,000 at 80% full economic cost.

Projects have a fixed start date of 1 May 2023 and end date of 31 March 2025.

Standard UKRI eligibility rules apply. Research grants are open to:

* UK higher education institutions
* research council institutes
* UKRI-approved independent research organisations
* eligible public sector research establishments
* eligible research and technology organisations
* NHS bodies with research capacity

[Check if your institution is eligible for funding](https://www.ukri.org/apply-for-funding/before-you-apply/check-if-you-are-eligible-for-research-and-innovation-funding/who-can-apply-for-funding/#contents-list).

You can apply if you are a resident in the UK and meet at least 1 of the following conditions:

* are employed at the submitting research organisation at a level equivalent to lecturer or above
* hold a fixed-term contract that extends beyond the duration of the proposed project, and the host research organisation is prepared to give you all the support normal for a permanent employee
* hold an UKRI, Royal Society or Royal Academy of Engineering fellowship aimed at later career stages
* hold fellowships under other schemes (please contact EPSRC to check eligibility, which is considered on a case-by-case basis)

Holders of postdoctoral level fellowships are not eligible to apply for an EPSRC grant.

Submissions to this funding opportunity will count towards the [EPSRC repeatedly unsuccessful applicants policy](https://www.ukri.org/councils/epsrc/guidance-for-applicants/unsuccessful-applicants-and-resubmissions/repeatedly-unsuccessful-applicants-policy/).

### Solutions for net zero challenges

Funding is available to support research into finding solutions for net zero challenges through the development and use of AI.

We are progressing the multidisciplinary approach to the development and application of AI outlined in the UKRI publication [transforming our world with AI](https://www.ukri.org/publications/transforming-our-world-with-ai/). As such, this is a UKRI activity led by EPSRC and is intended to include research that also involves BBSRC, ESRC and NERC remits. Any application must include research elements relevant to at least 2 councils’ remits.

The development and application of AI technologies can provide the solutions to support society in delivering greenhouse gas emission reductions and innovative solutions for net zero challenges across a range of sectors.

AI is a set of tools and techniques whose development is advanced when applied to real world problems.

This investment enables us to both advance the development of AI tools and techniques as well as provide net zero solutions. There are many diverse data sources where AI could be used to substantially advance their effective use and the UK is in a position to take advantage of these data sources.

### AI tools, techniques and capabilities

Proposals should seek to develop tools, techniques and capabilities in AI that:

* address greenhouse gas emissions to meet net zero targets
* focus on supporting activities that can make substantive progress towards delivery of real-world solutions, working closely with end users such as industry and policymakers

Co-creation between the AI community and other disciplines and sectors, to create novel and bespoke solutions which can progress both the technology and its application to net zero contexts is vital.

Proposals could employ AI to:

* advance understanding
* develop novel solutions
* make or improve decisions
* inform and enhance policy
* enable rapid progress towards net zero

In doing so, it is anticipated they are likely to also address key underpinning barriers to AI in a net zero context, such as the need to:

* increase adoption
* deliver improved interoperability and labelling of datasets
* de-risk adventurous approaches
* integrate across data sources and types, enabling better use or reuse of data
* crowd-in diverse expertise, disciplines and stakeholders needed to achieve a step-change in the field

### Research areas

This funding opportunity seeks to support agile projects creating strong foundations for the sector and invites applications that include high emitting areas highlighted (where it is noted that it is hard to reduce emissions).

#### Example areas

Please note that this is not an exhaustive list and other applications for AI to net zero challenges aligning with 1 or more of the 4 key areas, will be considered.

##### Energy

Including:

* grid operation or balancing
* demand management
* data analytics to understand customer energy usage, manage energy flow and optimise energy usage
* predictive data for energy trading
* blockchain technology for power purchase agreements
* create virtual power plants to understand future deliver options

##### Transport

Including:

* demand management across modalities understand how they interlink on demand
* AI-enabled transport logistics, maintenance and journey optimisation
* tools for efficient route planning
* AI systems to analyse travel planning and maintenance
* harmonised digital reporting for ships
* electronic freight transport information

##### Environment

Including:

* adaptation and resilience to natural hazards and extreme events, including impact mitigation
* prediction and management of water scarcity, droughts and flooding
* improved weather and climate prediction
* carbon capture and storage and observations and modelling of greenhouse gas emissions to predict and understand the impact of mitigation efforts
* use of nature-based solutions to deliver net zero
* enhanced use of sensing systems, models, and data sets to gain understanding of mitigation and adaptation

#### Agriculture and food systems

Including:

* targeting direct emissions from farm to fork
* improved traits to lower emissions in a range of climate scenarios
* approaches such as precision farming that reduce or eliminate high-greenhouse gas inputs
* improved land use and soil carbon management including:
  + sequestration
  + modelling of emissions
  + net zero-related trade-offs in agri-food systems
* reducing waste
* enabling better policy and supply chain interventions
* improving decision making by industry, consumers and other stakeholders

### Other considerations

It is vital that net zero solutions also consider key health, nutrient, and food safety needs, and the need to maintain and improve the natural environment and biodiversity.

It is expected that economic, social and behavioural research will be embedded within each submission, enabling key areas, such as (but not limited to):

* supporting net zero business decision-makers with reliable information about their emissions across their supply chains
* incentivising customers to sharing data with energy providers
* new regulation and standards for relevant technologies
* delivering net zero solutions
* data enabled business models
* understanding the cost of sharing data, barriers to behaviour, acceptance and confidence in AI linked to net zero

Successful projects will apply AI technologies and develop tools, techniques and capabilities across these themes to deliver tangible, immediate impacts to net zero.

Proposals that deliver to more than 1 area are welcome but should clearly articulate the link between the sectors and that linking these areas is appropriate. Proposals should demonstrate clear impact routes, for example within industry or policy (at national, regional or local scales), and be co-created and co-produced with users.

### Building a UK AI net zero community

This funding opportunity seeks to build a new community of AI experts working in close collaboration with net zero researchers to develop new AI tools and techniques to overcome key net zero challenges.

It is also intended to create a broad AI for net zero research community that includes both AI and net zero researcher.  As such all projects will be expected to allocate resource to:

* enhance and link to the wider landscape and ecosystem
* undertake substantial joint network, engagement and dissemination activities across business, the private sector and policymakers

In addition, they should make provision to link to the other successful AI for net zero projects (for example allocated time to sit on the advisory boards and hosting joint events). As well as the wider AI and net zero landscapes to create a truly innovative linked programme and engage across a diverse range of stakeholders.

It is expected that the successful proposals will contribute to building of national capacity in AI for net zero, for example by:

* developing AI capabilities with the interdisciplinary net zero community
* undertaking landscape mapping of investments related to their proposed research activity
* building capacity and skills, which could include running summer schools, 3-month ’fellowships’, joint conferences and papers
* demonstrating awareness and engagement of the AI and net zero sectors beyond their own particular research area
* detailing how they will contribute to an AI for net zero community that involves academics, industry and policymakers, drawing in relevant external expertise to the AI sector as appropriate
* spreading best practice and developing community assets

Successful applications will be expected to provide information and evidence to UKRI that will inform the future UKRI AI for net zero research strategy and wider AI landscape. This will support the longer-term sustainability for the sectors.

In addition, it is expected that each project will include support to engage across their AI field as the landscape and a wider portfolio of investments supported by UKRI develops. It is expected that the successful projects will coordinate their activities to form a larger AI for net zero community network. The network will exchange ideas, challenges and solutions as well as act as a source of strategic intelligence for UKRI.

Leaders of each investment will be expected to represent this community in collaboration with other investments across UKRI.

### Requirements

Resources requested in this application must be justified and appropriate for delivering the proposed outcomes and identify the main risks and put contingencies in place.

Successful proposals will also be expected to secure substantial leverage support (financial and in kind) and routes to accessing continued support throughout the lifetime of the project should be detailed.

Please note that applicants can be named investigators in a maximum of 2 proposals, but named as a principal investigator on only 1 proposal.

Success proposals will be multidisciplinary with applicants from more than 1 UK university.

Projects have a fixed start date of 1 May 2023 and an end date of 31 March 2025. No extension to the start date can be given. Applicants must have the necessary staff in place so that the projects can start on 1 May 2023.

Funding for this opportunity is subject to business case approval by the Department of Business, Energy and Industrial Strategy and HM Treasury

### Sustainability

UKRI’s environmental sustainability strategy lays out our ambition to actively lead environmental sustainability across our sectors. This includes a vision to ensure that all major investment and funding decisions we make are directly informed by environmental sustainability, recognising environmental benefits as well as potential for environmental harm.

In alignment with this, UKRI is tackling the challenge of environmental sustainability through our ‘building a green future’ strategic theme. The theme aims to develop whole systems solutions to improve the health of our environment and deliver net zero, securing prosperity across the whole of the UK.

Environmental sustainability is a broad term but may include consideration of such broad areas as:

* reducing carbon emissions
* protecting and enhancing the natural environment and biodiversity
* waste or pollution elimination
* resource efficiency and a circular economy

UKRI expects projects to embed careful consideration of environmental sustainability at all stages of the research and innovation process and throughout the lifetime of the project.

Projects should ensure that environmental impact and mitigation of the proposed research approaches and hub operations, as well as the associated project outputs and outcomes is considered.

Projects must also seek opportunities to influence others and leave a legacy of environmental sustainability within the broader operations of your academic and industry partners.

### Responsible innovation

UKRI is fully committed to develop and promote responsible innovation. Research has the ability to not only produce understanding, knowledge and value, but also unintended consequences, questions, ethical dilemmas and, at times, unexpected social transformations.

We recognise that we have a duty of care to:

* promote approaches to responsible innovation that will initiate ongoing reflection about the potential ethical and societal implications of the research that we sponsor
* encourage our research community to do likewise

Therefore applicants are expected to work within the [EPSRC framework for responsible innovation](https://www.ukri.org/about-us/epsrc/our-policies-and-standards/framework-for-responsible-innovation/).

Applicants planning to include international collaborators on their proposal should visit Trusted Research for information and advice on [how to get the most out of international collaboration while protecting intellectual property, sensitive research and personal information](https://www.cpni.gov.uk/trusted-research).

Grant holders will be expected to engage with the relevant regulatory bodies where concerns may arise under the [National Security and Investment Act](https://www.gov.uk/government/collections/national-security-and-investment-act). Aspects of bias, privacy, security and ethics should be considered where appropriate.

### Funding available

Up to £13 million is available for projects funded by this opportunity. Projects are invited between £1 million and £2.5 million at 80% full economic cost.

Equipment over £10,000 in value (including VAT) is not available through this funding opportunity.

Smaller items of equipment (individually under £10,000) should be included in the ‘Directly Incurred – Other Costs’ heading.

### Intent to submit

Applicants should submit an intent to submit application through [SmartSurvey](https://www.smartsurvey.co.uk/s/HB6R5Y/).

The survey will request:

* brief details of the title of the intended project
* the project principal investigator, proposed co-investigators and any other included organisations
* a brief 200-word description of your project

Please note that any intent to submit notification will be indicative and changes post submission are permitted.

### Applications

You must apply using the [Joint Electronic Submission (Je-S) system](https://je-s.rcuk.ac.uk/JeS2WebLoginSite/Login.aspx).

You can find advice on completing your application in:

* the [Je-S handbook](https://je-s.rcuk.ac.uk/Handbook/index.htm)
* [EPSRC guidance for applicants](https://www.ukri.org/councils/epsrc/guidance-for-applicants/)

We recommend you start your application early.

Your host organisation will also be able to provide advice and guidance.

### Submitting your application

Before starting an application, you will need to log in or create an account in Je-S.

When applying:

1. Select ‘documents’, then ‘new document’.
2. Select ‘call search’.
3. To find the opportunity, search for: AI for net zero.

This will populate:

* council: EPSRC
* document type: Standard Proposal
* scheme: Standard
* call/type/mode: AI for Net Zero

Once you have completed your application, make sure you ‘submit document’.

You can save completed details in Je-S at any time and return to continue your application later.

### Deadline

EPSRC must receive your application by 2 February 2023 at 4:00pm UK time.

You will not be able to apply after this time. Please leave enough time for your proposal to pass through your organisation’s Je-S submission route before this date.

You should ensure you are aware of and follow any internal institutional deadlines that may be in place.

### Attachments

You should attach your documents as PDFs to avoid errors. They should be completed in single-spaced Arial 11 font or similar-sized sans serif typeface. EPSRC will not accept any other attachment types under this opportunity.

Read our advice on [writing proposals for EPSRC funding](https://www.ukri.org/councils/epsrc/guidance-for-applicants/what-to-include-in-your-proposal/).

Your application must also include the following attachments:

* case for support (8 pages, 2 on your track record and 6 on the scientific case)
* workplan (1 page)
* justification of resources (2 pages)
* CVs (up to 2 A4 sides each) for named:
  + postdoctoral staff
  + researcher co-investigators (research assistants who have made a substantial contribution to the proposal and will be employed on the project for a significant amount of time)
  + visiting researchers
* letters of support from all project partners included in the Je-S form (no page limit), [EPSRC guidance on project partners letter of support](https://www.ukri.org/councils/epsrc/guidance-for-applicants/what-to-include-in-your-proposal/project-partners-letter-of-support/)
* technical assessments for facilities listed as requiring one in the Je-S guidance (no page limit)
* host organisation letter of support (2 pages)
* cover letter (optional attachment, no page limit, not seen by peer review)
* data management plan (1 page)

### Assessment process

Applications will not be assessed by postal peer review, instead they will be assessed by an expert panel that will make funding recommendations to UKRI.

Prior to going to panel applications will be assessed internally by the councils involved in this funding opportunity and any proposals that do not meet the cross-council requirement will be sift rejected before being sent to the expert panel.

The expert panel will assess and comment on the applications before the panel meeting. Their anonymised comments will be made available to the applicant principal investigators for a response that will be made available to the panel for discussion at the panel meeting.

The panel will be interdisciplinary and comprised of experts from across the research landscape.

Any proposal that receives low panel pre-assessment ratings will also be sift rejected before the panel meeting.

A portfolio approach will be used when awarding the investments to ensure projects across all thematic areas are supported.

### Assessment criteria

Submission to this funding opportunity will be assessed using standard assessment criteria.

#### Standard criteria

##### Quality (primary)

The research excellence of the proposal, including:

* the novelty, relationship to the context, timeliness and relevance to identified stakeholders
* the ambition, adventure, transformative aspects or potential outcomes
* the suitability of the proposed methodology and the appropriateness of the approach to achieving impact
* the interdisciplinary nature of the proposal and the research council remits that the proposal covers

##### National importance (secondary major)

How the research:

* contributes to or helps maintain the health of other disciplines
* contributes to addressing key UK societal challenges
* contributes to future UK economic success and development of emerging industry or industries
* meets national needs by establishing or maintaining a unique world-leading activity
* complements other UK research funded in the area, including any relationship to the UKRI portfolio, sustainability and trusted innovation
* plans for dissemination and knowledge exchange with potential beneficiaries of the research

##### Applicant and partnerships (secondary)

The ability to deliver the proposed project, including:

* appropriateness of the track record of the applicant or applicants
* balance of skills of the project team, including collaborators

##### Resources and management (secondary)

The effectiveness of the proposed planning and management and whether the requested resources are appropriate and have been fully justified, making reference to:

* any equipment requested, or the viability of the arrangements described to access equipment needed for this project, and particularly on any university or third-party contribution
* any resources requested for activities to either increase impact, for public engagement or to support responsible innovation
* effectiveness of the plan for stakeholder engagement and knowledge mobilisation strategies involving diverse stakeholders, including the UKRI office
* details of level of commitment from the industrial partner or partners and how additional leverage could be accessed over the lifetime of the award

#### Opportunity specific criteria

#### Fit to opportunity (primary)

Including:

* applications must engage with multidisciplinary research challenges that include at least 2 or more research councils remits
* applications must have more than 1 research institution and involve research groups from different regions of the UK
* appropriate resources must be requested to support community building, responsible innovation and, or, public engagement
* leverage substantial support from potential users of the research (cash and in-kind)
* demonstrate that they are mindful of the current research landscape beyond their own particular research focus area

This funding opportunity delivers to UKRI’s 2022 to 2027 strategy: transforming tomorrow together, to:

* support world-class impact
* focus the UK’s world-class science and innovation to target global and national challenges
* create and exploit tomorrow’s technologies
* build the high-growth business sectors of the future

It also addresses the opportunities laid out in the UKRI [transforming our world with AI report](https://www.ukri.org/publications/transforming-our-world-with-ai/) by, amongst other things:

* supporting developing new understanding and capabilities
* creating a networked and interconnected UK AI research and innovation community

### Key council strategies

In addition, this funding opportunity responds to a number of key council strategies including:

#### BBSRC’s delivery plan and agriculture and food security strategic framework

BBSRC’s [delivery plan](https://www.ukri.org/publications/bbsrc-strategic-delivery-plan/) and [agriculture and food security strategic framework](https://www.ukri.org/publications/agriculture-and-food-security-research-strategic-framework/), which highlight the role of technologies in meeting the urgent need to transform UK and global agri-food systems. Transformation to mitigate, adapt and build resilience to climate change, decarbonise, and reverse biodiversity decline, while delivering positive nutritional, health and environmental outcomes.

#### EPSRC’s AI, digitalisation and data: driving value and security

EPSRC will generate scientific and technical advances to realise the benefits of AI and digital technologies, creating opportunities and improving outcomes for the UK economy and society.

#### EPSRC’s engineering net zero

EPSRC will support a whole systems approach to support the research and innovation critical to the discovery, development and deployment of solutions to tackle climate change, enhance sustainability and ensure economic prosperity.

#### ESRC’s net zero, environment, biodiversity and climate change strategic priorities

ESRC will fund research that:

* generates the evidence needed to build resilience to environmental damage and climate change
* drives a successful social and economic transition to a net zero society and a sustainable and biodiverse environment
* informs sustainable growth and desirable social outcomes

#### NERC’s digital strategy

NERC’s first digital strategy sets out a vision for digitally enabled environmental science for the next decade.

Realising this vision for digitally enabled environmental science requires a digital ecosystem approach with integration across the cycle from data collection to its effective use.

This includes realising the potential of technologies such as AI and machine learning to advance world-leading environmental science. It will do this by supporting the development of new approaches to interrogating datasets and using them to develop new scientific insight, understanding and methodologies.

### Sustainable development goals

This funding opportunity responds to the following sustainable development goals:

* 7: clean and affordable energy
* 8: decent work and economic growth
* 11: sustainable cities and communities
* 12: responsible consumption and production
* 13: climate action
* 15: life on land