

Quick Reference

Please note that you must read the full Call document for guidance before submitting your proposal

Decarbonising Heating and Cooling

Call type: Invitation for proposals

Closing date: 16:00 Thursday 19 Sep 2019

Funding Available: Approximately £8 Million (80% FEC) is available to fund proposals (**Standard grant/Network plus grant**) of between £500K and £2M

How to apply: Intent to submit followed by Full Proposal

Assessment Process: Full proposals will undergo postal peer review followed by a panel, resulting in a rank ordered list. Full proposals can only be submitted by applicants that have submitted an Intent to Submit by the deadline. The Intent to Submit is not assessed. Proposals which do not have sufficiently supportive reviews from the postal peer review process to be competitive at panel will be rejected.

Key Dates:

Activity	Date
Call opening date	13 June 2019
Intent to Submit due	16:00 Tuesday 09 July 2019
Full Proposals deadline	16:00 Thursday 19 September 2019
Panel	Early February 2020
Funding decision	Mid February 2020
Grant start date	06 April 2020

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Decarbonising Heating and Cooling

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Closing date: 16:00 Thursday 19 September 2019

**Related themes: Digital economy, Energy, Engineering, ICT,
Manufacturing the future,**

Contents of this call document

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Summary

This call is to fund proposals to support the goal of the decarbonisation of heating and/or cooling. Proposals must be at least 50% within the remit of EPSRC.

Proposals can be for a research grant **or** for a Network Plus grant.

The research proposed must clearly address decarbonising heating, decarbonising cooling or decarbonising both heating and cooling.

Proposals that do **not** clearly address decarbonising heating, decarbonising cooling or decarbonising both heating and cooling as the main focus will be rejected as out of remit for the call.

It is expected that the funding available for this call is approximately £8 Million. We anticipate that proposals may vary considerably in scale and scope depending on the planned approach. Proposals should be for a maximum of £2 million and for a minimum of £500K. Proposals should be for 36 to 48 months duration.

We would expect proposals to be multi-disciplinary, and they may come from consortia or individual institutions and may address individual or multiple themes.

We expect proposals to engage with key organisations (academic, industry, policy etc.) in the energy landscape relevant to the proposed decarbonising heating and/or cooling research proposed.

Decarbonising heating and/or cooling across all settings – urban/rural, residential/industrial etc. is within scope.

Research Proposals

There are many approaches to decarbonising heating and/or cooling. Examples include –

- new technologies of heating and/or cooling,
- significant developments of existing technologies in terms of cost or efficiency,
- reduction of demand for heating and/or cooling,
- new methods or significant developments for heat storage or cold storage
- whole system or multi-vector heating and/or cooling solutions,
- modelling of heating and/or cooling solutions and interactions with the energy network.
- retrofit options
- technology choice
- research on hydrogen use for heating and/or cooling
- smart heat system optimisation

This call will take a portfolio approach as there is no consensus as to which approaches will provide the best solution. Therefore the aim is that projects funded by this call should support a wide range of potential solutions and for there not to be a significant proportion of proposals lying in the same area of research. To achieve this portfolio approach EPSRC will put each group of proposals into separate lists at the panel, based on their area of research. Network Plus proposals will also be on a separate list. Each list at the panel meeting will be rank ordered and the scoring will be tensioned across all proposals. Based on the rank ordered lists a funding decision will be made by EPSRC.

Industry involvement is not mandatory for proposals but it is encouraged, where appropriate, to provide potential pathways for the outputs of the research to result in decarbonising heating and/or cooling.

Proposals that have a value of more than £1 Million (80%FEC) should include within their research a component of economic or social science research. The challenges of decarbonising heating and cooling are multidisciplinary in nature and the aim of this economic and social science component should be to ensure that the research will achieve impact, for instance through policy, business model or consumer research. It is expected that the economic or social science aspect is fully integrated into the project and that interdisciplinary research occurs.

It is essential that proposals explain how the proposed research fits into the existing energy research landscape, specifically how the proposed research differs or is complementary to existing similar work. Proposed interactions with other research in the landscape to maximise progress and value for money should be described.

Applicants should include in their proposal how their research will potentially contribute to meeting decarbonising targets.

Network Proposals

Proposals can be for a Network Plus grant. The Energy Theme would like to support one Network Plus grant through this call to stimulate development of decarbonising heating and/or cooling research and communities. Network applications will be considered on a different list to research proposals at the panel meeting.

These networks will bring together relevant parts of the interdisciplinary energy communities and a variety of stakeholders, to identify the key research opportunities, build collaborations and grow the area of research of decarbonising heating and/or cooling for the benefit of the UK. Networks are intended to be UK-wide, and should involve a broad range of disciplines as well as non-academic stakeholders. The Network Plus could undertake a variety of activities including workshops, events, feasibility studies, secondments or horizon scanning. It is expected that the Network Plus would have a policy aspect. Applicants are encouraged to tailor their activities to the needs of the area and to be innovative in their approach.

Call Process

The call is for full proposals but an Intent to Submit must be completed by 09 July 2019.

The Intent to Submit form is available on the call page on the EPSRC website. The Intent to Submit is to help EPSRC plan the postal peer review and the panel; it will not be assessed.

The Full Proposal will be assessed by postal peer review. Proposals which do not receive sufficiently supportive reviews to be competitive at panel will be rejected. A PI response to the reviews for the sufficiently supported proposals will be requested.

On the basis of the Je-S form EPSRC will group proposals in substantially the same area of research to create funding lists.

The panel will generate a rank ordered list of proposals for each of the lists. Based on the rank ordered list and the available funds a funding decision will be made and the appropriate proposals funded.

Background

Heat accounted for 37% CO₂ emissions in the UK in 2016. Heat in this context covers Space Heating (and cooling), Hot Water, cooking and Industrial Processes. In order to meet the Paris Agreement target to 'hold global temperature rise at 'well below' 2°C above pre-industrial levels and pursue efforts to limit this rise to 1.5°C' and the Committee for Climate Change's suggested target of Net Zero greenhouse gas emissions by 2050 the challenging task of decarbonising heating and cooling is essential. The aim of this call is to fund projects which focus on Engineering and Physical Science research to address decarbonising heating and cooling.

The urgency to address the issue of decarbonising heating and cooling is illustrated by the following:

- A key announcement was made by the Chancellor of the Exchequer in his spring statement speech that new houses will have to be installed with "world leading" levels of energy efficiency and low-carbon heating, such as heat pumps rather than gas-fired central heating. The Chancellor said: "We will introduce a Future Homes Standard, mandating the end of fossil fuel heating systems in all new houses from 2025."

- Recent reports including:

Committee for Climate Change 'Net Zero – The UK's contribution to stopping global [warming](#)'

<https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

- BEIS - Clean Growth: Transforming Heating
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766109/decarbonising-heating.pdf
- POST - Carbon Footprint of Heat Generation
<https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0523>

The context for the challenges the call is aiming to address are as follows. Most of the heating in our industries and buildings is delivered by fossil fuels with natural gas the predominant source of heating for the vast majority of customers connected to the grid. The prevalence of the gas grid, which delivers more than twice the energy of the electricity grid, presents a particular challenge to the UK moving to low carbon heat. The burning of natural gas for heating contributes 14% of the UK's greenhouse gas (GHG) emissions. Whichever approaches are taken, the way heating is supplied to the nearly 24 million homes, businesses and industrial users connected to the gas grid will need to change. Ensuring this transition is as smooth as possible but timely represents a major national challenge over the coming years.

Heating is a more significant problem than cooling in the UK currently but an International Energy Agency report stated that globally 'The use of energy for space cooling ... more than tripled between 1990 and 2016.' This rise in the demand for cooling means that finding solutions to efficient, cheap and sustainable ways of cooling is a global problem. The Global Cooling Prize is an initiative to tackle the cooling challenge.

In March 2019 the EPSRC Energy theme held a Decarbonising Heating and Cooling workshop to support the scoping process for this call. The workshop identified the current barriers to decarbonising heating and cooling, suggested solutions to the barriers and noted current relevant research. These outputs are available on the call page on the EPSRC website.

The decarbonisation of heating and cooling faces significant challenges including:

- The seasonal nature of demand for heating and cooling
- The spikiness of demand for heating and cooling
- The significant cost of changing infrastructure
- Consumer behaviour and expectations
- The potential significant rise in the demand for cooling as the planet warms.

The March workshop identified engineering and physical sciences research that can address these interdisciplinary challenges. Therefore funding through this call is focussed on Engineering and Physical Sciences research which can add to our current investments in this area to make a substantial impact in decarbonising heating and cooling. This is a key area for EPSRC and we would like to be able to support this area with further funding in the future.

Decarbonising Heating and Cooling is clearly a global challenge and involvement with Mission Innovation countries on work that aligns with Innovation Challenge 7 (Affordable heating and cooling of buildings) is encouraged, but is not a requirement of the call. More information on Innovation Challenge 7 priority areas can be found here: <http://mission-innovation.net/our-work/innovation-challenges/affordable-heating-and-cooling-of-buildings/>.

For more information about EPSRC's portfolio and strategies, see our website: <https://epsrc.ukri.org/research/ourportfolio/>.

Information on Energy Demonstrators in the UK can be found in a Review of UK Energy System Demonstrators available here <http://www.ukerc.ac.uk/publications/review-of-uk-energy-system-demonstrators.html>.

Additionally, the 'Energy Innovation Needs Assessments: Low carbon heating and cooling report' from BEIS is provisionally due to be available in July.

Funding available

Approximately £8 million (80% FEC) is available for this call. This is to fund research projects between £500K and £2million. **Projects can be for a research proposal or a Network Plus proposal.** At most one Network Plus will be funded. Awards will be for between 36 and 48 months in duration. Applications must demonstrate how the proposed research clearly address the goals of the UK Research and Innovation Energy program: <https://epsrc.ukri.org/research/ourportfolio/themes/energy/programme/>

Network Plus

For a Network Plus application in particular please note the following. The funds awarded to a Network Plus grant should be used for the following;

- Core costs for investigator salaries, administrative support and general management of the network
- Engagement, communication and networking - including meetings, conferences and workshops to foster and strengthen relationships within the wider community and other UKRI investments, disseminate information and maintaining an awareness of current and upcoming developments.
- In addition each network will set aside an appropriate amount of 'plus' funds that can be used for organising activities open to the whole research community throughout the period of the award. An allocation for flexible funding could be used for supporting activities such as:
 - Funding for multidisciplinary feasibility projects that would subsequently support the strategic use of EPSRC standard mode funding (or other research council equivalent).
 - Early career researchers or to provide staff retention to support 'Equality, Diversity and Inclusion' activities within the network.
 - Funding for the network to adapt and react quickly, to changes in the energy landscape.
 - Running seminars, lectures, expert working groups, placements or exchanges, sandpits, skills training sessions etc.

Applicants are encouraged to be innovative in the kinds of user engagement, communications and knowledge exchange/impact generation activities they plan to undertake as part of the network activities. Flexible funds should be costed under 'directly incurred' and will be funded at 80%

Full Economic Cost. Post funding these can be moved between headings as appropriate.

It is required that the application process for network plus funded activities from the flexible fund will allow for applicants from outside of the network to participate, thereby drawing more people into the community of researchers. Applications for network plus awards should outline appropriate plans, including timelines, governance and assessment criteria, for the distribution of 'plus' funding.

Equality, Diversity and Inclusion

The long term strength of the UK research base depends on harnessing all the available talent and the Research Councils have together developed the ambitious UK Research and Innovation Equality, Diversity and Inclusion Action Plan <https://www.ukri.org/files/legacy/skills/action-plan-edi-2016/>

In line with the UK Research and Innovation Diversity Principles, EPSRC expects that equality and diversity is embedded at all levels and in all aspects of research practice. We are committed to supporting the research community in the diverse ways a research career can be built with our investments. This includes career breaks, support for people with caring responsibilities, flexible working and alternative working patterns. With this in mind, we welcome applications from academics who job share, have a part-time contract, need flexible working arrangements or those currently committed to other longer, large existing grants. Please see our Equality and Diversity webpages <https://epsrc.ukri.org/funding/equalitydiversity/> for further information.

Equipment

Equipment over £10,000 in value (inc. vat) is not available through this call. Smaller items of equipment (individually under £10,000) should be in the Directly Incurred - Other Costs heading.

For more information on equipment funding, please see: <https://epsrc.ukri.org/research/facilities/equipment/>

Eligibility

Any single investigator is permitted only one application to this call as a Principal Investigator. Any single investigator may be a Co-Investigator on more than one proposal but no more than three.

Please ensure sufficient time to create Je-S accounts for Investigators who do not currently have one.

For information on the eligibility of organisations and individuals to receive EPSRC funding, see the EPSRC Funding Guide: <https://epsrc.ukri.org/funding/applicationprocess/fundingguide/>

A list of eligible organisations to apply to EPSRC is provided at: <https://www.ukri.org/funding/how-to-apply/eligibility/>

How to apply

Submitting an application

The Intent to Submit at the bottom of the webpage for the call needs to be completed. Full proposals will only be considered from applicants who submitted an Intent to submit by the deadline.

For the Full Proposal you should prepare and submit your proposal using the Research Councils' Joint electronic Submission (Je-S) System (<https://je-s.rcuk.ac.uk/>).

When adding a new proposal, you should select:

- Council 'EPSRC'
- Document type 'Standard Proposal'
- Scheme 'Standard'
- On the Project Details page you should select the 'Decarbonising Heating and Cooling' call.

Although applications may be multi-institutional, only one Je-S form should be submitted per bid, and it is up to the lead organisation to coordinate costs, documentation, etc.

Please note that it is the responsibility of the lead organisation to ensure all the documentation is submitted correctly through Je-S. Late or additional documentation will not be accepted.

Note that clicking 'submit document' on your proposal form in Je-S initially submits the proposal to your host organisation's administration, not to EPSRC. Please allow sufficient time for your organisation's submission process between submitting your proposal to them and the call closing date. EPSRC must receive your application by **16:00 on Thursday 19 September 2019**.

Guidance on the types of support that may be sought and advice on the completion of the research proposal forms are given on the EPSRC website (<https://epsrc.ukri.org/funding/applicationprocess/>) which should be consulted when preparing all proposals.

Guidance on writing an application

Applications must be made through Je-S. As well as the Je-S form, the following documents should be submitted:

- Case for Support: should be up to eight pages in total, to include:
 - Up to two-page track record, which should detail the relevant expertise that each investigator will bring to the research
 - Description of the proposed research focus and how this fits the aim and scope of the call. Please see the 'Assessment criteria'. This

should include a clear statement of the proposal's vision, and how each strand of activity complements this vision.

- Pathways to Impact: should be up to two pages and is primarily for detailing the activities which will help develop potential economic and societal impacts. Please detail how the proposed research project will be managed to engage beneficiaries and increase the likelihood of impacts. More information on preparing the impact plan and on impact can be found on the EPSRC website at:
<https://epsrc.ukri.org/funding/howtoapply/preparing/impactguidance/>
- Justification of resources: should be up to two pages. This should be a narrative description of the need for the resources requested.
- Work plan: should be up to one page. It is not expected that this will be a Gantt chart for the whole time of the project, but should include a comprehensive plan for the start of the project and then refer to the management strategy to give appropriate milestones for when important decisions on the direction of the research will be taken. For advice on writing proposals see:
<https://epsrc.ukri.org/funding/howtoapply/preparing/>
- Project partner letters of support - where appropriate, should detail how the partner is contributing to the project and a quantification of the value of this support.
- Letters of support- will only be expected in exceptional circumstances where a partner cannot be listed as a project partner, but could provide information directly pertinent to the execution of the workplan (e.g. subcontractors).
- Cover letter- an optional attachment which is not seen by peer reviewers. Please highlight any information which may be pertinent to the processing and peer review of the proposal.

Applicants should use the Ethical Information section on the Je-S form to demonstrate to peer reviewers that they have fully considered any ethical issues concerning the material they intend to use, the nature and choice, current public perceptions and attitudes towards the subject matter or research area. EPSRC will not fund a project if it believes that there are ethical concerns that have been overlooked or not appropriately accounted for. All relevant parts of the Ethical Information section must be completed. If the research will involve human participation or the use of animals covered by the Animals (Scientific Procedures) Act 1986 it is recommended that applicants pay particular attention to the guidance highlighted below. EPSRC reserves the right to reject applications prior to peer review if the Ethical Information sections are not completed correctly.

Further guidance on completing the Je-S form can be found at <https://je-s.rcuk.ac.uk/Handbook/pages/GuidanceonCompletingaStandardG/EthicalInformation.htm>. Other relevant guidance includes: EPSRC's policy on animal use in research (<https://www.epsrc.ukri.org/about/standards/animalresearchpolicy/>) and the Responsible Innovation Framework (<https://epsrc.ukri.org/research/framework/>).

Please note that on submission to EPSRC **all** non-PDF documents uploaded onto Je-S are converted to PDF, the use of non-standard fonts may result in errors or font conversion, which could affect the overall length of the document.

For advice on writing proposals see:

<https://epsrc.ukri.org/funding/howtoapply/preparing/>

User Engagement Strategy

Successful applicants of projects over £1Million will be required to develop and execute a strategy for engaging with potential users of the research funded in the project (resources for this activity can be requested as part of the Pathways to Impact and must be justified in the application). This strategy should be reviewed and updated regularly as part of the formal management of the grant.

The strategy should cover:

- how and when potential users have been / will be identified;
- what form the engagement will take;
- what steps will be taken to ensure that outputs of the research are made available to potential users;
- suitable metrics for determining the success of the strategy in delivering value to users.

Assessment

Assessment process

The call is for full proposals but an Intent to Submit must be completed by 09 July 2019.

The Intent to Submit form is available on the call page on the EPSRC website. The Intent to Submit is to help EPSRC plan the postal peer review and the panel and is not for any assessment purpose.

The Full Proposal will be assessed by postal peer review. Proposals which do not receive sufficiently supportive reviews to be competitive at panel will be rejected. A PI response to the reviews will be requested for the sufficiently supported proposals.

On the basis of the Je-S form EPSRC will group proposals in substantially the same area of research to create funding lists. The panel will generate a rank ordered list of proposals for each of the lists.

Based on the rank ordered list and the available funds a funding decision will be made and the appropriate proposals funded.

Assessment criteria

Quality/excellence (primary criterion) Reviewers are asked to comment on the degree of research excellence of the proposal making reference to:

- (1) The novelty, relationship to the context, and timeliness;
- (2) The ambition, adventure, and transformative aspects identified;
- (3) The appropriateness of the proposed methodology

Importance (secondary major criterion) How the research:

- (1) Contributes to, or helps maintain the health of other disciplines, contributes to addressing key UK societal challenges and/or contributes to future UK economic success and development of emerging industry(s);
- (2) Meets national needs by establishing/maintaining a unique world leading activity;
- (3) Complements other UK research funded in the area, including any relationship to the EPSRC portfolio

Pathways to Impact (secondary criterion) Reviewers will comment on the pathway to impact identified for this work particularly:

- (1) How complete and realistic are the impacts identified for this work;
- (2) The effectiveness of the activities identified to help realise these impacts, including the resources requested for this purpose;
- (3) The relevance and appropriateness of any beneficiaries or collaborators.

Applicant (secondary criterion) Reviewers will comment on the applicants' ability to deliver the proposed project making reference to:

- (1) Appropriateness of the track record of the applicant(s);
- (2) Balance of skills of the project team, including academic partners.

Resources and Management (secondary criterion) Reviewers will comment on the effectiveness of the proposed planning and management and on whether the requested resources are appropriate and have been fully justified. If applying for a Network Plus grant please describe your application process for awarding flexible funding. The flexible funding should be available to applicants outside the network.

Proposal Assessment (secondary major criterion) Reviewers will be asked to comment on how the research complements other UK research funded in the area, including any relationship to the EPSRC portfolio. Specifically applicants should address how the proposed research advances decarbonising heating and cooling and contributes to meeting the Paris Treaty requirements.

Feedback

There will be no feedback from the Intent to Submit stage – there is no assessment of the Intent to submit.

Feedback on the Full Proposal is provided by the reviewer's comments and, unless sifted prior to the meeting, the rank order list information published on EPSRC's Grants on the Web (GoW) system shortly after the meeting. Occasionally there is specific feedback from the prioritisation meeting which will be passed to the applicant.

Guidance for reviewers

Information about the EPSRC peer review process and guidance for reviewers can be found at: <https://epsrc.ukri.org/funding/assessmentprocess/review/>

Guidance for reviewing standard grants can be found here:

<https://epsrc.ukri.org/funding/assessmentprocess/review/formsandguidancenotes/standardgrants/>

Additional grant conditions (AGCs)

Grants will be subject to the standard UK Research and Innovation grant conditions however the following additional grant condition will be added to this call (exact wording may vary):

AGC1: Grants awarded through this call for proposals are required to network together through their lifetime. As a minimum 2 workshops in the first 36 months of the grants to share outputs, co-ordinate on impact and stakeholder engagement are expected.

Resources can be requested as part of the application for the interaction with the other projects.

AGC2: Network Plus projects are required to produce an annual report for the community to describe the activities of the network in the previous year.

Moving forward

Submissions to this call will count towards the Repeatedly Unsuccessful Applicants Policy. Further information about the policy can be found at: <https://epsrc.ukri.org/funding/howtoapply/basics/resubpol/rua/>

Key dates:

Activity	Date
Call opening date	13 June 2019
Intent to Submit due	16:00 Tuesday 09 July 2019
Full Proposals deadline	16:00 Thursday 19 September 2019
Panel	Early February 2020*
Funding decision	Mid-February 2020
Grant start date	01 April 2020

*EPSRC aims to adhere to the key dates as published, however there may be exceptions where the prioritisation meeting may have to change due to panel member availability.

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- For Je-S related queries please contact the Je-s helpdesk
 - Email: JeSHelp@je-s.ukri.org
 - Phone: +44 (0) 1793 44 4164*
 - Staffed Monday to Thursday 8.30am to 5pm and Fridays 8.30am to 4.30pm (excluding bank holidays and other holidays)
- Please also consult your research office for help and advice on writing your proposal.

Change log

Name	Date	Version	Change
Gerard Davies	07 June 2019	1	N/A

Appendices:

Je-S attachments Check List

Standard:

Attachment Type	Maximum Page length	Mandatory/Optional	Extra Guidance
Case for Support	Eight pages	M	Comprising up to two A4 sides for a track record, and six A4 sides describing proposed research and its context.
Pathways to Impact	Two pages	M	
Workplan	One page	M	
Justification for Resources	Two pages	M	
CVs	Two pages each	As Required by EPSRC	For named and visiting researchers, and researcher co-investigators only.
Project Partner Letters of Support	No page limits	As Required by EPSRC	Must be included from all named project partners. Must be on headed paper, and be signed and dated within six months of the proposal submission date.
Letters of Support	No page limits	As Required by EPSRC	In exceptional circumstances a maximum of three letters can be submitted.
Technical assessment	No page limit	As required by EPSRC	
Proposal Cover Letter	No page limit	Optional	The cover letter can be used to highlight any important information to EPSRC. This attachment type

			is not seen by reviewers or panel members.
Other attachment	No page limit	As required, at EPSRC request only	This can be used for a document that does not fit under any of the headings above. This attachment type is not seen by reviewers or panel members.