

ARCHER2 UK National Supercomputing service: delivering real benefits to the UK

An independent study has demonstrated that the scientific and economic benefits enabled by the ARCHER2 service, which is operated by EPCC, are substantial.

- More than **£4.2bn** in benefits to the UK economy since launching in 2022.
- Equivalent to a return of **£8.30** per **£1** of public funding invested in the service and the research and development (R&D) undertaken on it.

Expanding science

ARCHER2 gives researchers the tools to undertake high quality, high impact computational science and remain competitive internationally. It also improves the efficiency of R&D by enabling users to undertake complex simulations, ultimately enabling UK researchers to undertake more computational science.

- Over **2,100** ARCHER2-related papers published across **20** different fields of research.
- **27,486** citations within **23,756** other papers, an average of **12.8** citations per publication.

Industry benefits

Publicly-funded R&D generates significant economic and wider social welfare benefits through a number of channels. This includes where publicly-funded R&D directly benefits private companies and, in turn, lead to wider economic and social impacts through knowledge transfers, and the direct commercialisation of academic research.

- **123** commercial organisations from micro to large firms, including at least five spin-outs, have accessed the service.

Embedded CSE (eCSE) Programme

The eCSE Programme provides funding to researchers to develop software on ARCHER2, enabling them to develop and optimise software in a sustainable manner.

- **93** eCSE projects supported, funding **1,114** project months across nearly **35** institutions. Of these, **12** projects optimised software for GPU-based systems, helping these codes to efficiently utilise these increasingly common compute architectures.



The ARCHER2 service, funded by UKRI, and delivered by EPCC, the University of Edinburgh and HPE Cray, a Hewlett Packard Enterprise company.

“These outcomes from ARCHER2 usage clearly demonstrate the contribution that access to supercomputing makes both for science and for society as a whole.” Jane Nicholson, Executive Director for Research, EPSRC

Skills development

ARCHER2 has been crucial to the development of advanced computational skills within the research community, ensuring the benefits of HPC are maximised.

- **145** training events provided by EPCC from 2020-2025.
- **270** training days provided.
- **2,800** attendees (around **2,000** unique individuals) recorded across all training events.

EPCC also provides supporting virtual tutorials and webinars covering a wide range of topics.

- More than **2,650** students and postdoctoral researchers have used ARCHER2, gaining hands-on experience in advanced computational R&D.

In addition to the achievements described overleaf, wider benefits have also flowed from the ARCHER2 service.

Public outreach

EPCC runs a range of UK public outreach activities that demonstrate the benefits of high-performance computing and encourage young people to consider a career in science, technology, engineering or mathematics.

Activities range from attending science festivals to providing work experience for high school students. Offerings include Wee Archie, a Raspberry Pi cluster built by EPCC to demonstrate the principles of a full-sized supercomputer.

- Outreach events attended or held by EPCC from 2022–2025 attracted approximately **245,000** visitors.

Reduced HPC carbon footprint

EPCC's commitment to environmental sustainability leads to significant reductions in ARCHER2's carbon footprint, establishing it as a benchmark for sustainable supercomputing.

ARCHER2 provides tools that help users calculate the carbon footprint of their work. This helps researchers understand the climate impact of their jobs and adjust their workflows where possible.

ARCHER2 is powered using 100% certified renewable electricity via a Scottish Government public sector contract. As such, the service is classified as Net Zero in operation by the Scottish and UK Governments.

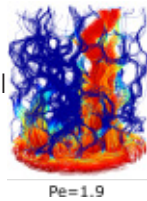
Enabling science

Some examples of ARCHER2's contribution to essential science.

Porous materials

Understanding how fluids and chemicals flow through porous materials is essential for many areas of research. Researchers at Heriot-Watt University and the University of Edinburgh have enhanced the GeoChemFoam modelling code to allow it to fully exploit the computational power of ARCHER2. As a result, the code can now run more precise simulations in greater detail, with a quicker turnaround time.

Hannah P. Menke (Heriot-Watt University), Gavin J. Pringle (EPCC, University of Edinburgh), Julien Maes (Heriot-Watt University).



Freeze desalination

Ice formation is central to a surprisingly wide range of technologies: from preserving food texture and protecting biological samples, to preventing ice damage in microfluidic devices, and producing clean water. Researchers from the University of Edinburgh and Swansea University have used the computational power of ARCHER2 to gain new insights into this process, and in particular how surface vibrations can be used to control when and where ice forms.

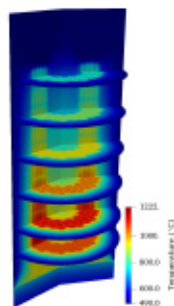
Pengxu Chen, Santiago Romero-Vargas Castrillon, Rohit Pillai (University of Edinburgh), Saikat Datta (Swansea University).



Nuclear reactors

Ensuring the safety of nuclear reactors under all conditions, including potential accidents, is a cornerstone of their design and operation. Researchers from STFC Daresbury Laboratory have used the power of ARCHER2 to significantly improve the modelling of the behaviour of advanced nuclear reactors under extreme accident scenarios.

Dr Bo Liu, Dr Wei Wang, Dr Charles Moulinec, Dr Stefano Rolfo (Scientific Computing, STFC).



ARCHER2 Final Evaluation Report on the scientific and economic impacts of ARCHER2 by London Economics (2025): <https://edin.ac/40RfUSk>

<https://www.archer2.ac.uk>