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# UK Research and Innovation

# ARCHER2 unit of allocation

## Definition of the new unit

Since EPSRC-NERC’s Tier-1 national service is transitioning from the current ARCHER system to the upcoming ARCHER2 system there will be a need to transfer existing user allocations from the old system to the new system.

As part this transition UKRI have also reviewed the unit of allocation. UKRI have decided to call the new unit of allocation on ARCHER2 the CU (the ARCHER2 Compute Unit) and in general it will be equivalent to 1 node hour on ARCHER2, i.e.

**1 CU : 1 ARCHER2 node hour**.

However, different rates will apply under specific policies, e.g. a discount will be applied for jobs on the low priority weekend queue.

## Transferring existing ARCHER allocations to ARCHER2

When the ARCHER service ends UKRI and the Service Provider will record the remaining allocations for each ongoing project. Upon the start of the ARCHER2 service there is expected to be a period where usage is uncharged whilst the system is stabilised. Following that stage ARCHER2 will begin its business-as-usual phase, at which point UKRI and the Service Provider will assign a new allocation (in CU) to each project based on compute remaining at the end of the ARCHER service.

UKRI aims to ensure that no user will be disadvantaged by the transfer of their allocation from ARCHER to ARCHER2. In particular:

1. As far as can be reasonably guaranteed, every project should be able to do at least as much science with its replacement allocation on ARCHER2 as it was able to do with its remaining allocation on ARCHER at the end of service.
2. UKRI is preparing policies for allowing additional time for some projects to use the replacement allocations. This will be depending on factors including the route via which users received their allocations and the project end dates. Information on these will be distributed in due course.

### Establishing the conversion rate

In order to achieve point (a) above, UKRI have decided that for the purpose of the conversion we are going to use a conservative estimate of a 5 times increase in scientific throughput from ARCHER to ARCHER2, as required by the ARCHER2 tender documents.

UKRI wishes to emphasise that, based on the benchmarking figures obtained during the procurement (see below), it is likely ARCHER2 will have significantly greater than 5 times the scientific throughput of ARCHER.

|  |  |
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| **Benchmarked code** | **Increase in science throughput ARCHER2 relative to ARCHER** |
| CP2K | 8.7x |
| OpenSBLI | 9.5x |
| CASTEP | 11.3x |
| GROMACS | 12.9x |
| HadGEM3 | 18.0x |

However, UKRI recognise that the performance increase for codes which were not benchmarked is not known. Therefore, using the conservative estimate of 5x throughput should ensure that most projects will get greater throughput from their replacement ARCHER2 allocations than from their existing ARCHER allocations. In particular, we expect most existing projects will be able to conduct more science than with their ARCHER allocations.

Using the conservative estimate of the overall performance increase, we get a conservative per node performance increase of:

$$Performance of an ARCHER2 node relative to ARCHER node= \frac{4920}{5848}×5≈4.21$$

This in turn (using the establish conversion of 0.36 kAU : 1 ARCHER node hour) leads to the conversion rate:

1.5156 kAU : 4.21 ARCHER node hour : 1 ARCHER2 node hour : 1 CU.

This is also illustrated in the following diagram.

