Empowering The University of York's Research with Sustainable HPC

Executive Summary

The University of York deploys its state-of-the-art high-performance computation in its Viking 2 cluster, located at EcoDataCenter 1 in Falun, Sweden.

The cluster has been instrumental to much of the university's research, **underpinning more than £27.5 million worth of research grants in 2024**.

The university has **slashed its carbon footprint from HPC with 93%** by moving its cluster to Sweden.

"*The Viking facility provides a vital facility for research, but we have also shown UK higher education that it is possible to run these facilities in a sustainable way*", notes Dr. Emma Barnes, Head of Research and Faculty IT at University of York.

The Viking 2 cluster helps the University of York produce new, useful research and knowledge to share, and supports new generations of scientists and discoveries.

A Powerful Move for Research Excellence

During the 2023 hardware refresh cycle, institution leaders and the IT department faced tough decisions.

Soaring energy prices in the UK threatened to limit the research capacity at York University, a leading UK research institution. There were limited domestic options for novel, future-proof and sustainable data centers.

And when consulting users within the organization, latency was less important than previously thought, freeing up the search for new infrastructure partners to new regions such as the Nordics.

Conventional UK data centers did not focus their business around sustainability like Nordic counterparts. Here, EcoDataCenter's core idea of sustainable digital infrastructure came into full swing for the University of York.

EcoDataCenter's supply of fully renewable energy was attractive, as well as the customer-focused monthly climate reporting. Building data centers in wood to eliminate a majority of the life cycle emissions was equally appealing.

As Emma Barnes, Head of Research and Faculty IT at University of York, summarized: "*EcoDataCenter's infrastructure offered a way forward to not only preserve, but expand, the capacity for high-quality research with real-world impact*."

Helping Each Other to Improve

In an unusually rapid deployment for systems of this size, spanning three weeks rather than the six months seen in other similar projects, the university's new cluster **Viking 2 went live in Falun in November 2023**.

EcoDataCenter's deep understanding of HPC infrastructure allowed the university's researchers and decision-makers to focus on their tasks, underscoring the importance of customer-centered services for projects, deployments and societal impact. Relocating its HPC cluster to Sweden enabled a substantial systems upgrade.

The Viking 2 cluster offers 12,864 compute cores, 48 NVIDIA A40 GPUs and 12 H100 GPUs, dramatically expanding computational capacity while cutting operational costs and emissions compared with its predecessor.

Because EcoDataCenter manages and maintains the hardware and infrastructure, York's HPC team can dedicate their time to supporting researchers and developing innovative services.

Bridging Disciplines to Grow the Research Ecosystem

Even though most applications for the Viking 2 cluster is seen within Physics, Engineering, and Technology (PET), Biology and Computer Science, high-performance computing is not the preserve of physicists and chemists.

The data from the Viking 2 service shows how it supports many disciplines and fields:

- **Over 1,500 registered users** from **20 schools and departments**, ranging from chemistry, economics and psychology to languages, arts, environmental research and medical educations.
- **56 percent** of users are undergraduate or in a position teaching postgraduate students – indicating that Viking 2 is a key part of teaching as well as research.
- In total, the University of York estimates that **around 400 separate projects** have been directly using the new facility.

Infrastructure with Real Impact

The diverse user base has already produced **74 research outputs** such as papers, datasets, software and more **within the first 18 months of operation**. That is four tangible knowledge assets every month, or one per week.

Choosing EcoDataCenter to handle the underlying infrastructure ensures that scientists can focus on their research. Some examples of research conducted with the help of the Falun-based cluster is:

- **Breathing for Speech** – Breathappy, a collaboration with Speech & Language Therapists at York Hospital
- **BabblePlay**, an app for encouraging babies to babble
- Development of **instruments and control software** within the Wolfson Atmospheric Chemistry Laboratory and the Department of Chemistry
- Various elements of a satellite payload in the area of **quantum communication**
- Development of CellPhe, a software tool for **analysing and identifying cells**.

Already, projects using the cluster have attracted **£27.5 million** in research funding, with the cluster explicitly named in awards worth £10.5 million.

For Dr. Emma Barnes, that is no surprise. "*These numbers show that investing in sustainable HPC is more than an environmental choice. It is a catalyst for attracting talent and resources*."

With several years of service still ahead, the Viking 2 cluster will generate significant amounts of novel, impactful research and knowledge to share.

Efficiency at Scale

The Viking 2 cluster has already delivered **75 million CPU hours** and **380,000 GPU hours** of computation in its first year. CPU hours underpin most research workloads, while GPU runs accelerate artificial intelligence and data-intensive tasks.

Over **1.81 million individual jobs**, ranging from short, interactive analyses to multiday simulations, were completed on Viking 2 between June 2023 and October 2025 – demonstrating the reliability and throughput of the service.

With the cost savings from powering Viking 2 (comparing electricity prices in the UK with the low prices and operational costs in Sweden), the university could invest in new software to support data sharing for experiments and build better pipelines for managing research data, which can be automated to open up both new research opportunities and commercial uses.

Climate-friendly Computing

Choosing EcoDataCenter ahead of UK-based data centers made a profound difference for the University of York.

"*The University of York sees sustainable research IT infrastructure as a key to expediting positive change*", says Dr. Emma Barnes. "*That includes looking broadly at the environmental impact of our work and research output*."

Looking at historical data, current and future requirements, and the broader context of conducting research sustainably, Emma's team saw opportunities for meaningful change.

"We learned that our researchers' work was not very affected by latency between their work stations and the HPC infrastructure", noted Emma Barnes. "*So we could prioritize data centers powered by renewable energy and driven by an idea to change the way we handle data and digital services. And we really found a full-fledged partner in EcoDataCenter."*

With the world's first large-scale data center facility built with wood, sourced from nearby forests, and a mixture of hydro and wind power to run it all, EcoDataCenter turns computational by-products into carbon savings.

For the University of York, an on-campus location of Viking 2 had emitted 192 tons of CO_2e per year. By deploying their infrastructure with EcoDataCenter, the number is reduced to 14 tons – **a decrease of around 93 percent**.

The university also avoids more than 100 kg CO_2e annually through EcoDataCenter's heat reuse within the local energy system.

Beyond Infrastructure: People, Partnerships and an Expanding Supercompute Region

Looking forward, the University of York is implementing web-based access via OpenOnDemand and secure data transfer through Globus. That will help more students and researchers new to HPC to try their ideas and develop their research projects, and open doors to new collaboration models.

The university is also involved in the group **N8 Research Partnership**, including the eight most research-intensive universities in Northern England, to maximize the impact of this research base and drive economic growth. One example is securing funding for internships promoting themes such as **digital health**, **digital humanities**, and **machine learning**. This will build new pathways for young, promising students to explore and establish research career opportunities.

Around the University of York, **a new supercompute region is growing**. In late 2025, the university announced its partnership with the **Bioeconomy Cluster**, a public initiative by the York and North Yorkshire Combined Authority's Mayoral Business Innovation Fund.

The cluster supports research, innovation and start-ups in agritech, sustainable food production and bio-based manufacturing. The aim is to launch **100 bio-based start-ups**, create **thousands of high-quality jobs** and **grow the regional bioeconomy by £5bn**.

With a powerful and sustainable HPC service, the University of York can contribute to the Bioeconomy Cluster with good conscience.