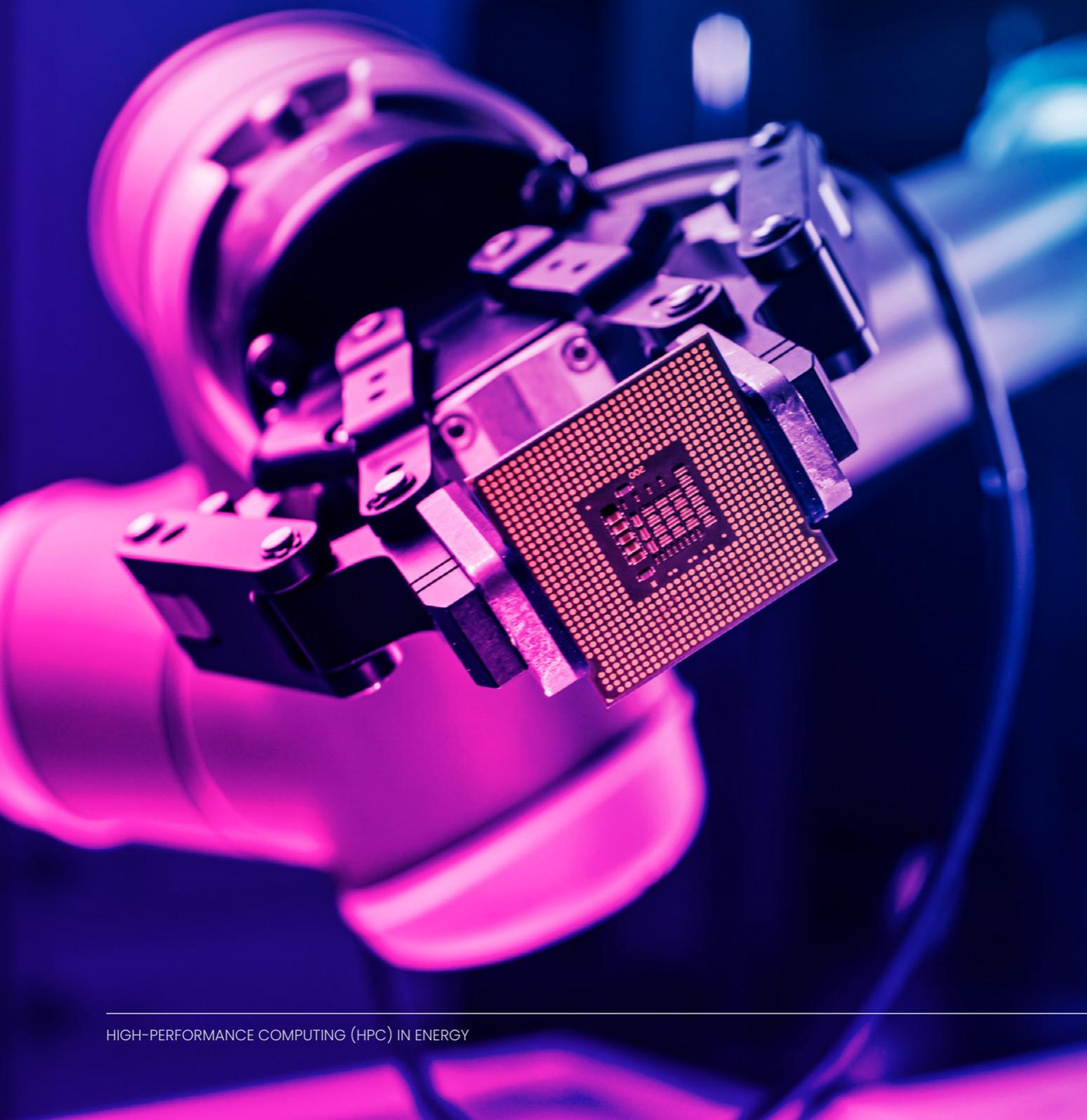




HIGH-PERFORMANCE COMPUTING (HPC) IN THE ENERGY SECTOR

THE OCF AND NVIDIA
EXPLAINER GUIDE





HIGH-POWERED COMPUTE FOR A FAST-GROWING SECTOR

As the energy sector continues to move forward at pace, the intelligent use of data is proving vital in identifying and scaling cleaner, greener energy initiatives.

HPC provides the raw power needed to process the rapidly growing data volumes that are essential to uncovering insights and driving successful business operations.

Fully understanding the benefits of HPC, and how to embrace them, is a common concern for the energy market.

This guide highlights the value and real-world use cases of HPC, exploring challenges and showing how OCF and NVIDIA offer the solutions needed to help businesses reap the full insights from their data.

THE BENEFITS OF HPC



HPC consolidates compute power into a centralised resource, helping to optimise resource measurement, management and allocation, in a more dynamic and less wasteful way.



HPC enables companies to drive innovation in ways that were previously not possible – allowing energy harvesting machines, like wind turbines, to be equipped with intelligent sensors that HPC gathers and processes data from.

This level of data-driven predictive maintenance was previously hard to achieve but is now made possible through HPC-powered AI machine learning. The insights from this data are vital in helping oil, gas and energy firms drive sustainability and green-energy initiatives forward faster than their competition.

It's predicted we'll see **463 exabytes of data per day** by 2025.¹

HPC can perform **quadrillions of calculations** per second.²

Global research shows that **97% of companies** that have adopted HPC platforms say they won't survive without one.³



HOW ARE INDUSTRY LEADERS USING HPC?

SIEMENS GAMESA

Siemens Gamesa is working with NVIDIA to create physics-informed digital twins of its wind farms to generate electricity. The business uses thousands of wind turbines across the globe, generating 100 gigawatts of wind power annually – enough to power nearly 87 million homes.

Using NVIDIA Omniverse and Modulus – which together make up NVIDIA's digital twin platform for scientific computing – Siemens Gamesa created virtual representations of its wind farms. This is helping it achieve faster calculations to optimise the layout of wind farms, increasing energy production while reducing loads and operating costs.

SECTOR: RENEWABLE ENERGY

HPC: SIMULATION



HOW ARE INDUSTRY LEADERS USING HPC?

QED NAVAL

QED Naval, an SME based in Edinburgh, is a specialist in supporting the design and deployment of renewable energy installations that utilise wind, tidal and wave power to generate electricity. The company heavily relies on sophisticated simulations to achieve its goals, often under tight budget and time constraints.

As part of the Subhub project, aimed at reducing the cost of deploying tidal turbines, QED Naval needed to carry out simulations using ANSYS Fluent computational fluid dynamics software. But its infrastructure wasn't sufficient to achieve the necessary runtime and it didn't have the capital investment to establish an in-house HPC system.

After trialling the solution, QED Naval engaged with OCF's enCORE – a "platform as a service" HPC offering on a fully commercial basis. The trial simulated run times 4.2x faster than what could be achieved by QED Naval in-house.

With no prior HPC experience, QED Naval found OCF's guidance critical in delivering the right outcomes. The affordable enCORE solution allowed QED Naval to compete with much larger competitors, delivering speed, efficiency and the ability to conveniently secure results. It gave the business the ability to control costs, by only paying for resources when needed, resulting in it being able to expand its share in a rapidly evolving market.

SECTOR: RENEWABLE ENERGY

HPC: SIMULATION

WHY IS THE ENERGY MARKET HESITANT TO EMBRACE HPC?

COSTLY SET-UP

HPC set-up is expensive, and systems must be future-proofed to ensure dynamic scalability as data demands increase. This leads to energy companies opting to purchase workstations over time, instead of making a larger, one-off investment which is harder to sign off.

SKILLS SHORTAGES

There's also a skills shortage for IT professionals and data architects capable of building and managing HPC systems and ensuring ongoing compatibility with emerging technologies. Those with these skills are in high-demand, and finding and recruiting them can be a challenge. The fact that HPC primarily uses Linux as an OS – not Windows – compounds the need for specialist talent.

LACK OF HPC EXPERTS

Oil, gas and energy providers often face barriers when trying to internally develop HPC systems. There's a skills gap of HPC-trained experts, a problem that is especially acute when delivering at scale. This shortage makes talent acquisition a challenge for smaller businesses with restrictive budgets and can lead to engineers having to pick up HPC projects which eat away at their valuable time.

PERFORMANCE WORRIES

Network performance, interconnect latencies, and data protection are also a concern – as large data loads must be transmitted quickly and efficiently between multiple computing nodes, storage devices, and input/output devices.

75% of IT executives say talent shortages are their biggest risk factor in deploying technology.⁴

42% of digital leaders are struggling to find people with data and analytics skills in the UK.⁵

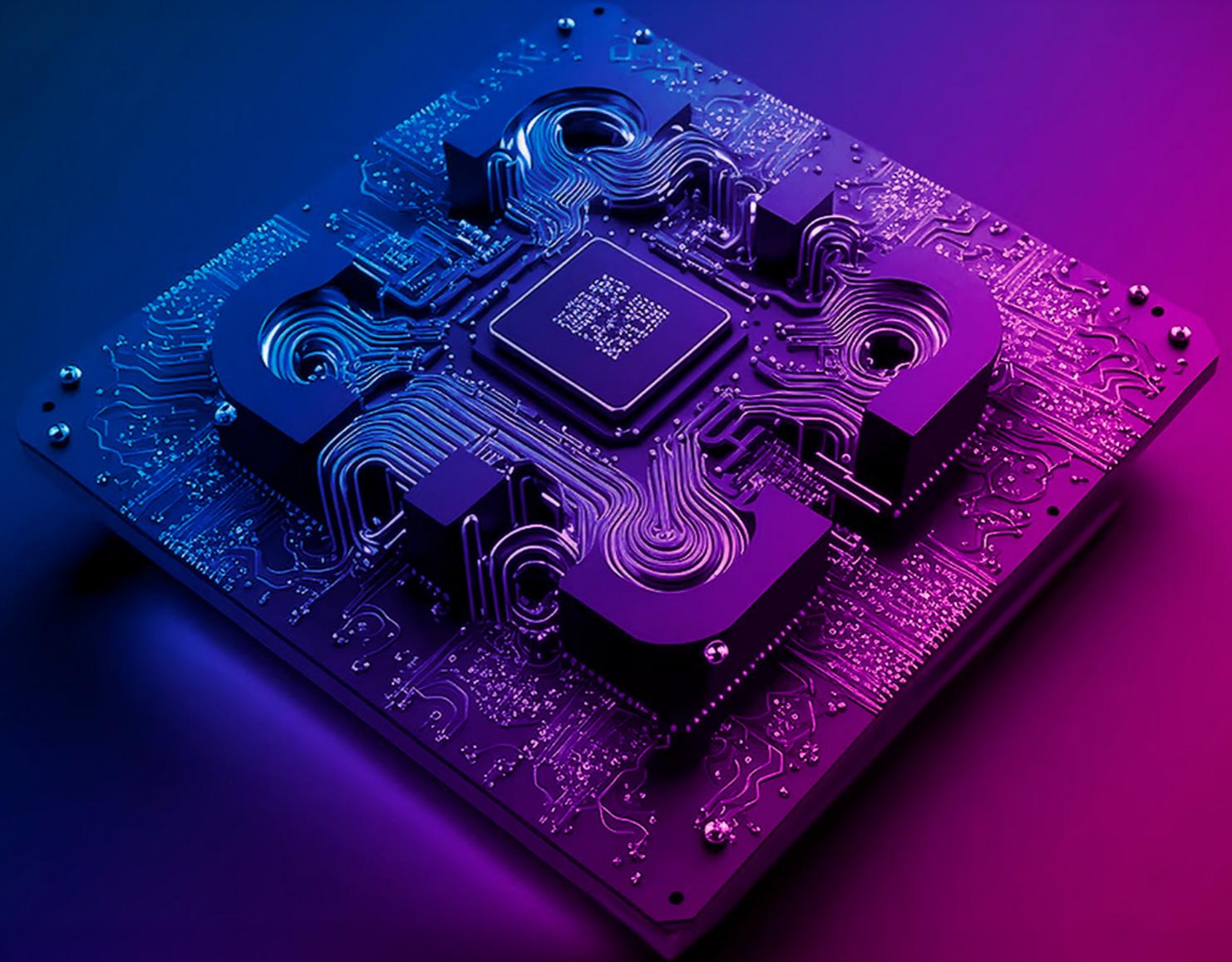


UNLOCK THE POWER OF HPC WITH OCF AND NVIDIA

OCF and NVIDIA empower businesses in the energy market to unlock the potential of a secure and powerful HPC solution to meet existing and future performance demands.

With HPC from OCF and NVIDIA, businesses can free up teams to focus on their goals – whether that's working on other IT projects or utilising the new compute to accelerate research and development.

For every **\$1 invested** in HPC, oil and gas generates **\$416 in revenue** with **\$54 of that being profit.**⁶



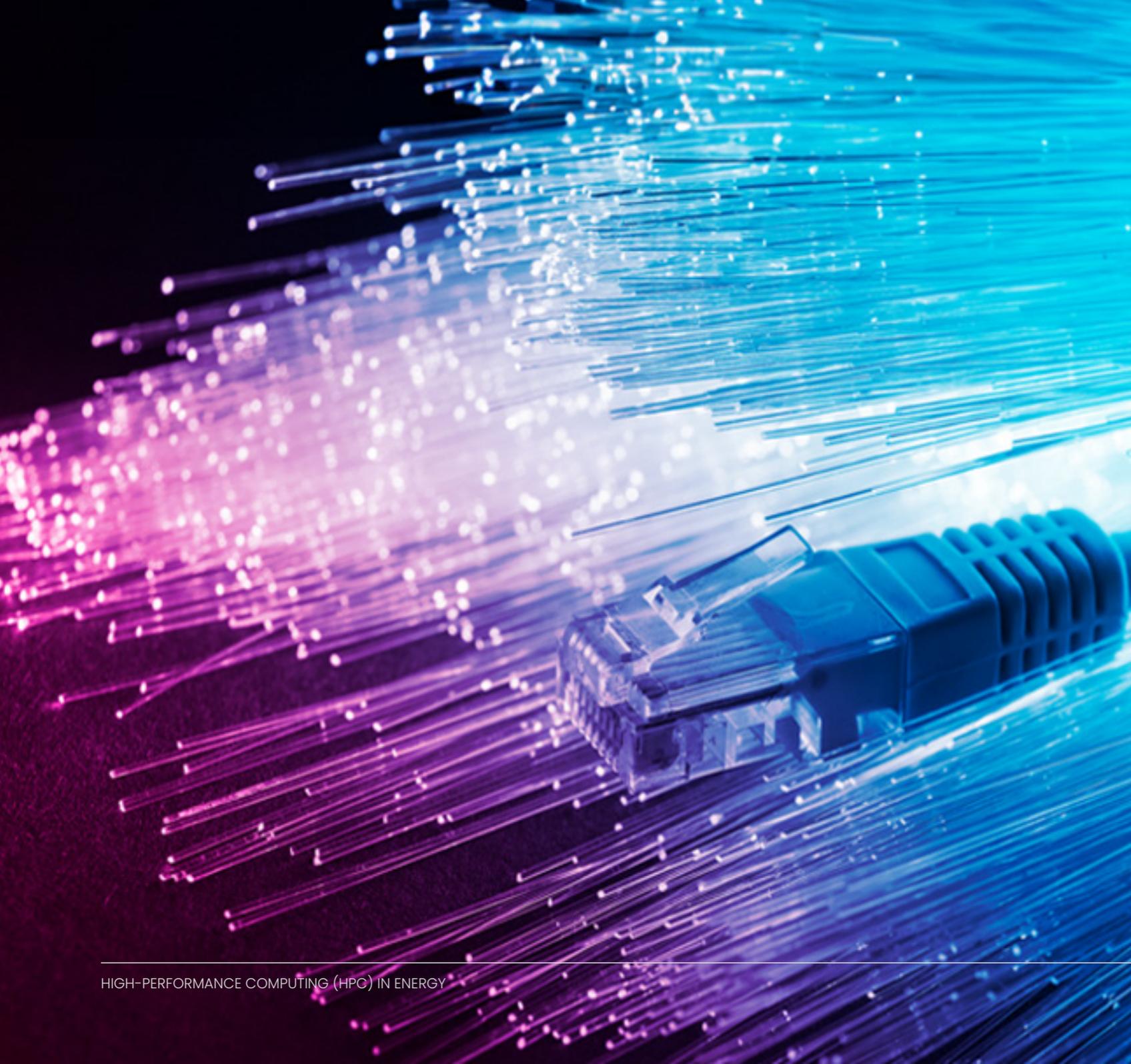


OCF's team is comprised of seasoned industry experts, with many having over 20 years of experience with HPC – ensuring OCF's team can work with first-time buyers or more experienced customers.

As an Elite NVIDIA partner, OCF offers customers a true end-to-end experience, working from initial consultancy through to design and managed services.

OCF's in-house technical architects develop solutions from tried-and-tested building blocks – ensuring best practices are at the heart of every solution – before optimising and tailoring them to suit specific customer needs. And OCF's experts provide ongoing support to adapt HPC solutions as a customer's business needs and challenges change, futureproofing investments.

OCF offers a managed service to alleviate the technical and skills-shortage challenges of day-to-day administration for HPC clusters. In addition, OCF offers training sessions to ensure every key worker is equipped with the HPC knowledge they need.



NVIDIA

NVIDIA's high-performance in-network technology enables large amounts of data to be transmitted quickly and efficiently – delivering maximum output from HPC infrastructure.

With the choice of InfiniBand or Ethernet, NVIDIA provides a comprehensive, end-to-end, high-performance networking solution. It's also the world's only fully offloadable, In-Network Computing platform.

NVIDIA networking products are designed to allow businesses to start small and scale when required – ensuring growth occurs when appropriate and without wastage. And as your computing demands grow, NVIDIA gives you the flexibility and scalability to manage complex workloads and extreme-sized data sets without compromising on speed.

NVIDIA also offers extensive support when using in-house code on its GPUs.

END-TO-END HPC SUCCESS STARTS WITH OCF AND NVIDIA

OCF and NVIDIA are the key to unlocking the full benefits of every HPC solution. OCF combines decades of technical expertise with trusted partnerships to develop and deliver an industry-leading, NVIDIA-powered HPC solution.

OCF works collaboratively with NVIDIA and other independent software vendors to understand existing and emerging challenges facing the oil, gas and energy sector.

OCF's experts are problem solvers with the technical expertise needed to identify bottlenecks in your systems and the ideal solutions to solve them – examining:

- Your current IT usage and what needs to be updated, replaced, or optimised
- Your current in-use applications and whether they are scalable, optimisable, and compatible with HPC



The global HPC market is set to expand at a 4.4% compound annual growth rate (CAGR) in the next ten years.⁷



TECHNICAL PRE-SALES CONSULTANTS

Experts in solution architecture design and able to evolve your solution with changing demands.



BUSINESS DEVELOPMENT MANAGERS

Relationship builders with deep technical expertise, able to understand and act on your short and long-term business demands.



HPC TECHNICAL CONSULTANTS

A team of highly skilled consultants with leading expertise across NVIDIA HPC solutions and its wider portfolio.



IT PROJECT MANAGERS

PRINCE2 certified and highly experienced in delivering NVIDIA HPC solutions using proven methodologies.

OCF'S END-TO-END PROCESS

-  **RESEARCH**
OCF's experts explore your business' short and long-term compute needs and challenges.
-  **DESIGN**
The OCF team explores different HPC options to suit your defined business requirements, budget constraints, and timeline goals.
-  **PRESENT**
OCF presents you with everything our team has learned, including any insights and recommendations, before we agree on an approach.
-  **DOCUMENT**
You receive a detailed document outlining the approach and plan for implementation.
-  **IMPLEMENT**
OCF's technical experts work to deliver the solution.
-  **REVIEW**
OCF's team measures success to develop future optimisation and strategies.



CONTACT OCF FOR NVIDIA TODAY

HPC from NVIDIA and OCF can help your energy sector business deliver on its environmental ambitions – providing the high-impact processing power needed to deliver innovation and operational enhancements at speed.

OCF's experts utilise our years of experience to pinpoint the perfect HPC solution for your business, based on a thorough examination of your unique needs, challenges and priorities. Our deep expertise in current and future technologies means we can offer ongoing support throughout your adoption – helping to futureproof your investment with continuous optimisations.

**Achieve your HPC goals with OCF and NVIDIA.
Get in touch to start your journey.**

[Contact now](#)

Sources

1 Gov UK, 2022

2 Tech Target, 2021

3 Digital Journal, 2022

4 Gartner, 2021

5 Computer Weekly, 2022

6 HPCwire, 2020

7 Global News Wire, 2023