

## Special Report

# European Parliament Endorses EuroHPC Exascale Initiative

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## HYPERION RESEARCH OPINION

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This report looks at the European approach to developing both exascale computers and an indigenous, self-sufficient HPC supply chain in Europe. In recent years the EU and its Member States, along with countries including China, Japan, and the United States, have increasingly recognized the strategic importance of investing more heavily in supercomputing to accelerate scientific and industrial innovation.

The European Commission in particular has stressed the need to strengthen Europe's supply chain for this transformational technology and has ramped up funding and development activity, especially under the European Extreme Data & Computing Initiative (EXDCI), an umbrella organization encompassing PRACE and the ETP4HPC. A bellwether event was the formation in January 2018 of EuroHPC, a legal and funding instrument designed to pool EU and national resources and private investment. The goal of this effort was to enable the creation and acquisition of two pre-exascale supercomputers in 2020-2021 and two full-exascale systems in 2023-24, plus additional advances through 2026 aimed at making Europe one of the world's top three supercomputing powers.

On July 3, 2018, the European Parliament voted to support the EuroHPC Joint Undertaking, setting the stage for Europe's bold plan to begin, including the campaign to amass nearly €1 billion to fund EuroHPC from the Commission, the 20 (so far) European nations participating in the joint undertaking, and private sector contributors. One step remains to set EuroHPC in motion: the Council of the European Union now needs to approve the joint undertaking.

In recent years, the European Commission and Member States have been pursuing a strategy to increase European capabilities in high performance computing, including:

- New funding mechanisms to help procure pre-exascale and full-exascale systems
- Methods to make these large supercomputers available to researchers across Europe
- The development of indigenous processors and systems
- Investments in software and applications to make the next generation of supercomputers more useful

Hyperion Research applauds the European actors who pushed successfully for the structural change underpinning EuroHPC, which creates the basis for the Commission and Member States to pool money more easily, making the goal of European HPC leadership not just technically, but also financially feasible. We are on standby for the EU Council to take the expected final step.

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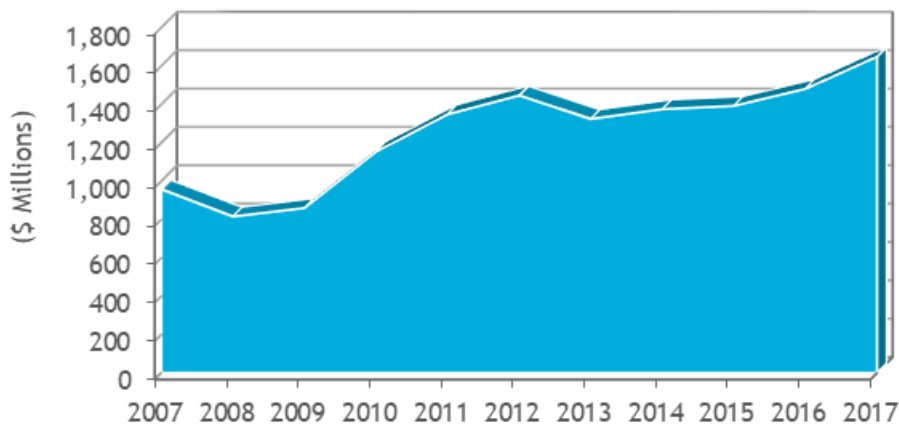
## IN THIS STUDY

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This brief report looks at progress Europe has made in its efforts to become a world-class supercomputing power. Over the last ten years, Europe has increased its purchases of supercomputers (systems costing \$500,000 or more) by a sizable amount, as shown in Figure 1. A problem from the European standpoint is that a large majority of these supercomputers have been supplied by U.S. and other non-European vendors. A key goal of Europe's HPC strategy is to strengthen Europe's own HPC supply chain.

**FIGURE 1**

### European Purchases of Supercomputers



Source: Hyperion Research 2018

### Current Status

On June 25, in conjunction with the start of the annual ISC 2018 European supercomputing conference in Frankfurt, the European Council, charged with defining the European Union's overall political direction and priorities, announced its support for the Commission's plans to invest jointly with the Member States in building a world-class infrastructure for supercomputing in Europe, via the EuroHPC Joint Undertaking. On July 3, the European Parliament voted in favor of the EuroHPC Joint Undertaking.

The press release announcing plans for EuroHPC in January 2018 detailed the expected benefits as follows:

- High Performance Computing is a critical tool for understanding and responding to major scientific and societal challenges, such as early detection and treatment of diseases or developing new therapies based on personalized and precision medicine. HPC is also used for preventing and managing large-scale natural disasters, notably for forecasting the paths that hurricanes are following or for earthquake simulations.

- The EuroHPC infrastructure will provide European industry and in particular small and medium-sized enterprises (SMEs) with a better access to supercomputers to develop innovative products. The use of HPC has a growing impact on industries and businesses by significantly reducing product design and production cycles, accelerating the design of new materials, minimizing costs, increasing resource efficiency and shortening and optimizing decision processes. For example, the use of supercomputers can reduce car production cycles from 60 months to 24 months.
- High Performance Computing is also essential for national security and defense, for example when developing complex encryption technologies, tracking and responding to cyberattacks, deploying efficient forensics or in nuclear simulations.

Now that the European Parliament has approved plans for the joint undertaking, the final step is getting an endorsement by the Council of the EU. In that highly likely event, Europe will have overcome a major barrier to becoming one of the world's top HPC leaders, and it will benefit significantly from the creation of a new and more efficient mechanism that will enable Member States as well as the Commission and Member States to pool funds more easily. Indeed, that structural change in itself would be a significant achievement for the EU HPC development and user community.

The long-term budget goal is to fund a European HPC infrastructure whose highlights include the procurement of 2 pre-exascale supercomputers in 2020-2021 and 2 full-exascale supercomputers in 2023-2024, along with additional activities out to the year 2026. Specifics call for EuroHPC to collect just under €1 billion, with €486 million coming from the EC side and much of the rest from cash and in-kind contribution from participating European nations and the private sector.

Some European officials have told Hyperion Research, however, that the decision to base the European exascale systems on an ARM-based CPU under development in the European Processor Initiative (EPI) could delay deployment of the exascale systems by a year or so. The officials stress, however, that any delay would be more than offset by Europe's eventual realization of an indigenous, competent HPC-grade CPU for the longer term.

Based on conversations with officials during the recent ISC conference in Frankfurt, Hyperion Research believes it is likely that the first European exascale supercomputers will be installed at sites in France and Germany (likely at one of Germany's three national supercomputing centers).

## Key Project Goals

The overall goals of the EuroHPC initiative are ambitious and varied and they will require significant cross-nation collaboration to improve the potential for success. They include:

- Providing European industry and in particular SMEs with a better access to supercomputers to develop innovative products
- Developing world-class HPCs with indigenous technology
- Allowing European scientists and industry to process their data in the EU, reducing problems related to privacy, data protection, commercial trade secrets, and ownership of data in particular for sensitive applications

- Building a sustainable world-class HPC ecosystem in timeframes that are compatible with those of non-EU competitors through in collective efforts
- Securing the EU's independent access to top HPC technology

## European HPC Server Purchases by Country

Table 1 shows the HPC server purchases by country in 2017. Germany, France, the UK (Brexit aside) and Italy continue to be the largest buyers of technical servers. Germany and France account for almost half (47%) of all European HPC server purchases.

**Table 1**

### European HPC Server Purchases by Country (\$M)

	2017
Germany	931
France	647
UK	469
Italy	336
Central Eastern Europe	193
Rest of Europe	166
Spain	161
Sweden	145
Switzerland	92
Norway	79
Netherlands	66
Denmark	45
Finland	37
<b>Total</b>	<b>3,366</b>

Source: Hyperion Research 2018



## In Summary

The EU, along with countries including China, Japan, and the United States, increasingly recognizes the strategic importance of investing more heavily in R&D for supercomputing. Over the last few years, Europe and the EU have been developing plans to increase European leadership in high performance computing technologies and have recently put in place actions designed to develop advanced, indigenous, HPC capabilities.

Now that the European Parliament has approved plans for the EuroHPC Joint Undertaking, the final step is getting an endorsement by the Council of the EU. In that highly likely event, Europe will have overcome a major barrier to becoming one of the world's top HPC leaders, and it will benefit significantly from the creation of a new and more efficient mechanism that will enable Member States as well as for the Commission and Member States to pool funds more easily. Indeed, that structural change in itself would be a significant achievement for the EU HPC development and user community.

## About Hyperion Research, LLC

Hyperion Research provides HPC information, analysis, and recommendations based on technology and market trends. Research includes market sizing and forecasting, share tracking, segmentation, technology and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). Providing thought leadership and practical guidance for users, vendors and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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