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ANNEX

**ANNEX**

**to the**

**Commission Decision**

**on the Union financial contribution to the European High Performance Computing  
Joint Undertaking for 2019**

## ANNEX

### **Description of activities for 2019 for the European High Performance Computing Joint Undertaking**

#### **1. INTRODUCTION**

On the basis of the objectives given in the Article 3 of the Council Regulation (EU) 2018/1488<sup>1</sup>, this work plan contains the activities to be financed and the budget breakdown for the activities implemented under indirect management for year 2019.

Legal basis

Council Regulation (EU) 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking, OJ L 252, 8.10.2018, p. 1–34.

Budget lines

<b>Budget line concerned</b>	<b>Heading</b>
09 03 05 31	European High Performance Computing Joint Undertaking (EuroHPC)
09 04 07 33	European High Performance Computing Joint Undertaking (EuroHPC) – Support expenditure
09 04 07 34	European High Performance Computing Joint Undertaking (EuroHPC)

Objectives pursued

The overall objectives of the Joint Undertaking can be summarised as follows (Article 3 of the Regulation):

- to provide the research and scientific community, as well as the industry including SMEs, and the public sector from the Union or countries associated to Horizon 2020 with the best available and competitive High Performance Computing and data infrastructure and to support the development of its technologies and its applications across a wide range of fields;
- to provide a framework for the acquisition of an integrated, demand-oriented and user-driven world-class petascale and pre-exascale supercomputing and data infrastructure in the Union;
- to provide Union-level coordination and adequate financial resources to support the development and acquisition of such infrastructure, which will be accessible to users from the public and private sector primarily for research and innovation purposes;
- to support an ambitious research and innovation agenda to develop and maintain in the Union a world-class High Performance Computing ecosystem, exascale and beyond, covering all scientific and industrial value chain segments, including low-power processor and middleware technologies, algorithms and code design, applications and systems, services and engineering, interconnections, know-how and skills, for the next generation supercomputing era;
- to promote the uptake and systematic use of research and innovation results

<sup>1</sup> OJ L 252, 8.10.2018, p. 1.

generated in the Union by users from science, industry, including SMEs, and the public sector.

Given its inter-disciplinary nature and its ability to process large amounts of data and carry out complex computations, HPC is essential to address a wide range of key scientific, industrial and societal applications, such as for example in: earth science and climate change; secure, clean and efficient energy; health, demographic change and wellbeing; food security, sustainable agriculture, marine research and the bio-economy; pharmaceuticals and chemistry; aerospace and automotive; cybersecurity and defence; smart, green and integrated urban planning; cosmology and astrophysics, etc.

Actions of the EuroHPC programme do not necessarily have to limit themselves to covering only one of these key applications; on the contrary, multi-capability actions will be encouraged wherever relevant. This cross-capability work is vital in creating initiatives of adequate critical mass and vital in fostering innovation that will contribute to the overall goals of EuroHPC.

#### Expected results

The achievements of the Joint Undertaking will consist of:

- **Supercomputing and Data Infrastructure programme: Acquisition and operation of** at least two world-class pre-exascale supercomputers (capable of around  $10^{17}$  calculations per second) and two mid-range petascale supercomputers, and providing and managing access to these systems to a wide range of public and private users. These supercomputers will be hosted in national Supercomputer Centres (hosting entities) already established in Member States. The acquisitions (following public procurement processes) are foreseen for 2020, as the hosting entities' selection must be done first.
- **Research and innovation programme on HPC:** to support the development of European supercomputing technology including the first generation of European low-power microprocessor technology, and the co-design of European exascale machines, and to foster applications, skills development and a wider use of High Performance Computing.

Regarding the pre-exascale systems, the EuroHPC Joint Undertaking will be the owner of supercomputers it has acquired. The Union's contribution from Horizon 2020 and CEF funds should cover up to 50% of the acquisition costs plus up to 50% of the operating costs of the pre-exascale supercomputers. The operation of each pre-exascale supercomputer will be entrusted to a hosting entity.

In the case of petascale supercomputers, the Union's contribution from Horizon 2020 and CEF funds should cover up to 35% of the acquisition costs of the supercomputers, to align with the existing funding for innovation procurement in Horizon 2020. The EuroHPC Joint Undertaking should jointly with Participating States procure the petascale supercomputers. The operation of each petascale supercomputer should be entrusted to a hosting entity.

## 2. ACTIONS IMPLEMENTED IN INDIRECT MANAGEMENT

### 2.1. Support Expenditure

Budget line

Budget line concerned	Heading
09 04 07 33	European High Performance Computing Joint Undertaking (EuroHPC) – Support expenditure

Implementing entity

European High Performance Computing Joint Undertaking (EuroHPC)

Description

The support expenditure budget will amount to **EUR 2 296 121<sup>2</sup>** in 2019. It will be used to cover staff expenditure and the infrastructure and Joint Undertaking operating expenditure. It represents 100% revenues from the General Union Budget and is subject to its adoption by the budgetary authority; it may be updated accordingly.

- The staff expenditure will cover the costs related to the recruitment of new staff, the remunerations, mission expenses, socio-medical infrastructure and training.
- The infrastructure and operating expenditure will cover the costs related to JU building associated expenses, movable property, telecommunication and other administrative expenditure. It will also serve to cover the running costs in connection with the operational activities (SLAs, evaluations, reviews, etc.), communication and audits.

### 2.2. Call for Selection of Hosting Entities

Implementing entity

European High Performance Computing Joint Undertaking (EuroHPC)

Description

The EuroHPC Joint Undertaking will initiate and manage the Calls for Expression of Interest for hosting petascale and pre-exascale supercomputers and evaluate the offers received, with the support of independent external experts. The hosting entity will be selected by the Governing Board of the Joint Undertaking following the call for expression of interest.

Pursuant to Article 8 of the EuroHPC Regulation, the EuroHPC Joint Undertaking shall entrust to a hosting entity the operation of each individual pre-exascale supercomputers it owns.

The following Call of Expression of Interest for selection Hosting Entities is currently foreseen:

<sup>2</sup> This amount includes EFTA contribution of EUR 52 377 (2019 EFTA rate – 2.38%).

<b>Subject</b>	<b>Indicative timetable, 2019</b>
Call for selection of Hosting Entities	Q1

### 2.3. Public Procurement – Petascale and Pre-exascale Supercomputers

Implementing entity

European High Performance Computing Joint Undertaking (EuroHPC)
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Budget line

<b>Budget line concerned</b>	<b>Heading</b>
09 03 05 31	European High Performance Computing Joint Undertaking (EuroHPC)

Description

<p>In 2019, the EuroHPC JU will carry out a number of activities via calls for tenders for an indicative amount of <b>EUR 40 019 544<sup>3</sup></b>.</p> <p>The Joint Undertaking has the target of equipping the Union with an infrastructure of petascale and pre-exascale supercomputers by 2020. To this purpose, the Joint Undertaking will launch calls for tenders for the acquisition of at least two world-class pre-exascale and at least two petascale supercomputers.</p>
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The following list of procurements is currently foreseen:

<b>Subject</b>	<b>Indicative timetable, 2019</b>
Calls for Tender of petascale Supercomputers	Q3
Calls for Tender of pre-exascale Supercomputers	Q3

### 2.4. Calls for Proposals

Implementing entity

European High Performance Computing Joint Undertaking (EuroHPC)
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Budget line

<b>Budget line concerned</b>	<b>Heading</b>
09 04 07 34	European High Performance Computing Joint Undertaking (EuroHPC)

<sup>3</sup> This amount includes EFTA contribution of EUR 930 323 (2019 EFTA rate – 2.38%).

## Description

In 2019, the EuroHPC Joint Undertaking will carry out a number of activities via calls for proposals for an indicative amount of **EUR 156 076 223<sup>4</sup>**.

The Private Members of the EuroHPC Joint Undertaking, the private associations ETP4HPC and BDVA, representing the HPC community, have identified priorities for indirect actions to be launched in the 2019–2020 period: HPC technologies and systems, and Applications. These priorities will be discussed and adopted in the form of a multiannual strategic research and innovation agenda by the Research and Innovation Advisory Group of the EuroHPC Joint Undertaking. The final decision corresponds to the Governing Board, which will adopt an annual work plan and will approve the launch of Calls for proposals for indirect actions with the associated budgets.

The identified priorities address the mastering of the R&D process to develop exascale HPC technologies and systems in Europe for real and relevant applications of scientific, social and industrial value, the preparation of applications for the upcoming exascale systems, and the widening of HPC use by supporting competence and skills developments. In particular, the following actions are foreseen:

### **1. European Processor Initiative**

The European Processor Initiative (EPI) develops and implements the roadmap for European HPC chips and accelerators facilitating the development of exascale machines. A Framework Partnership Agreement between the European Commission and the EPI consortium (already established) supports with a stable financial and contractual framework the long-term development of such technologies. The EPI Phase 1 is funded by the Horizon 2020 work programme 2018-2019.

The further development of this topic will be financed by the EuroHPC Joint Undertaking and proceed along the following lines:

- EPI Phase 2: developing the first European HPC Systems on Chip and accelerators. Specific focus is on exascale HPC.
- EPI Phase towards exascale: Co-design and integration of EPI in extreme performance platforms towards European exascale supercomputers.

### **2. Extreme Scale Technologies and Applications**

The support for a sustainable exascale HPC ecosystem in Europe requires action on the technology supply to develop extreme scale, power-efficient and highly resilient HPC and data technologies. It requires also actions to adapt and scale up applications with tangible benefits for addressing scientific, industrial or societal challenges for upcoming exascale and extreme performance computing capabilities.

The development of this topic will proceed along the following lines:

- Extreme scale computing technologies (hardware, software, methods and algorithms for key applications)
- HPC applications to ensure European leadership

### **3. Widening HPC skills and use**

Widening the use of HPC and attracting new talents requires the creation and coordination of

<sup>4</sup> This amount includes EFTA contribution of EUR 3 628 261 (2019 EFTA rate – 2.38%).

national HPC Competence Centres across the Union. They will engage in training and outreach activities for academic, industrial and public sector users. Especially SMEs need better access to HPC tools and services to increase their innovation capability.

The development of this topic will proceed along the following lines:

- Increase the knowledge and human capital and upraise HPC capabilities, including through the creation of national HPC Competence Centres and their networking and coordination across the Union
- Federating European supercomputing resources
- Support to SMEs

The following list of calls for proposal is currently foreseen:

Call indicative topics	Indicative Call launch timing	Indicative budget (in EUR)	Call process
1. Extreme Scale Technologies and Applications	Q1	90 000 000	single stage
2. Widening HPC skills and use	Q1	26 076 223	single stage
3. European Processor Initiative	Q3	40 000 000	single stage
<b>Total</b>		<b>156 076 223</b>	

Details about the eligibility, selection and award criteria; the co-financing rates applied for grants; information on the calls' timetables and the criteria for evaluating the submitted proposals will be described in the EuroHPC Joint Undertaking Work Plan 2019. The adoption of the Work Plan 2019 by the Governing Board with the final topics list and budget is foreseen for the end of December 2018.

It is foreseen that the calls for proposals will have one stage. Forms of funding envisaged in the calls are exclusively grants.

The EU contribution is based on the budget foreseen for the EuroHPC Joint Undertaking in the general Union budget. In 2019, the total EU contribution for the support and operational expenditure is **EUR 198 391 888<sup>5</sup>**; it represents 100% revenues from the General Union Budget 2019. The amount is subject to its adoption by the budgetary authority and may be updated accordingly.

<sup>5</sup> This amount includes EFTA contribution of EUR 4 611 961 (2019 EFTA rate – 2.38%).