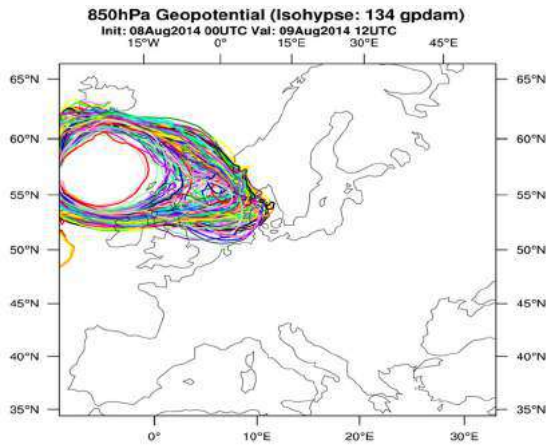
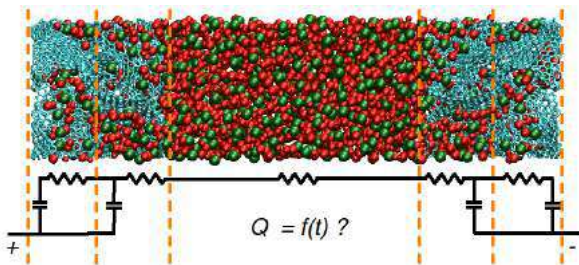


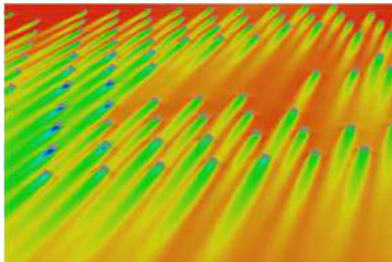
EoCoE: success stories



Meteorology: More accurate indicators for imminent extreme **weather forecast** errors. Image credits to H. Elbern et al. - FZJ, Germany



Materials: Accelerate design of **supercapacitors** to store energy faster! Image credits to M. Salanne - MdS, France



Wind: Improving **wind-resource assessment** for energy production. Image credits to A. Gargallo et al. - BSC, Spain

Consortium

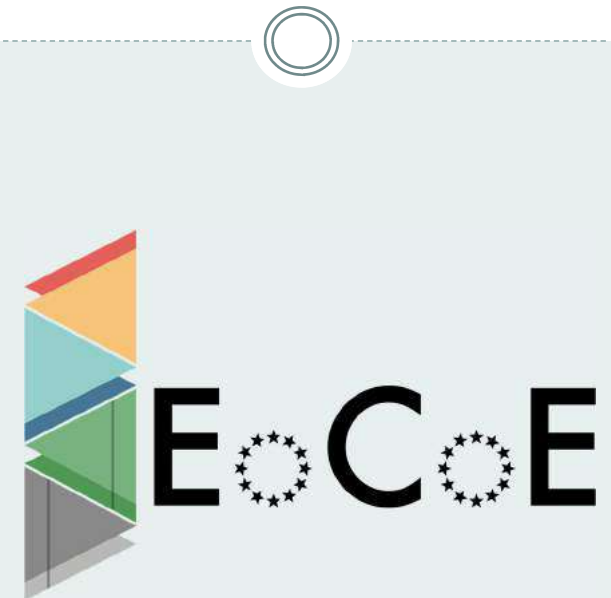
- ✱ Maison de la Simulation (MdS) and Institut de Recherche sur la Fusion par confinement Magnétique (IRFM) at CEA
- ✱ Forschungszentrum Jülich (FZJ), with RWTH Aachen University
- ✱ Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA)
- ✱ Barcelona Supercomputer Centre (BSC)
- ✱ Centre National de la Recherche Scientifique (CNRS) with Inst. Nat. Polytechnique Toulouse (INPT)
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- ✱ IFP Energies Nouvelles (IFPEN)
- ✱ DDN Storage

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European Union funding
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EoCoE has been refunded in 2019 through the new project "EoCoE-II" which receives support from the European Commission "Horizon 2020" Framework Programme under grant number 824158.

EoCoE ... in figures

7 EU countries

22 partner institutions

over 100 experts

9 pre-exascale flagship codes



EoCoE ... in a nutshell

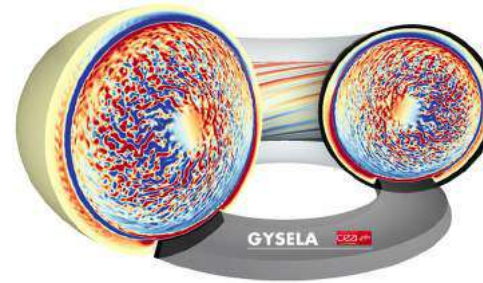
The rapid adoption of renewable energy sources is seen as a key element in the European energy policy. Renewable energy sources would help to reduce greenhouse gas emissions from fossil fuels and decouple energy costs from oil prices.

EoCoE, the energy-oriented Centre of Excellence for computing applications, builds on its unique expertise at the crossroads of high-performance computing (HPC) and renewable energy. It brings an impulse to accelerate the digitization of the future energy systems.

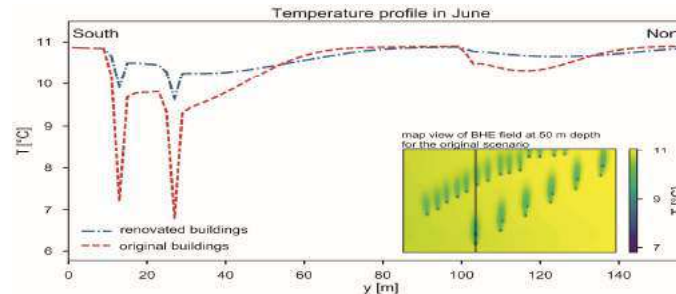
To achieve this goal, EoCoE focuses on key energy sectors: **wind**, **meteorology**, **materials**, **water** and **nuclear fusion**. It aims to re-design and promote selected application codes from these sectors and make them ready to exploit exascale computing architectures.

The coding developments will be assisted by multi-disciplinary teams with expertise in applied mathematics and high-performance computing (HPC).

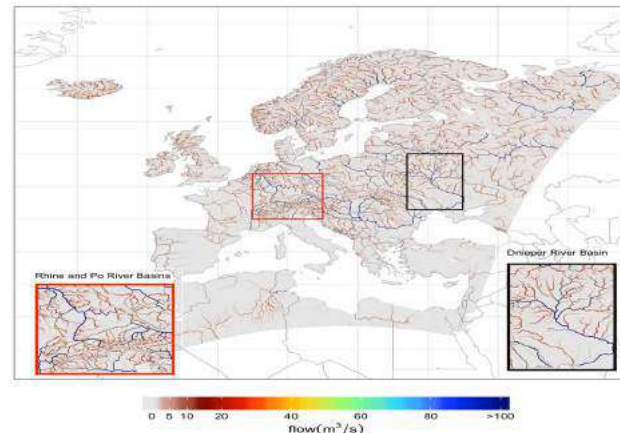
EoCoE: success stories



Nuclear Fusion: Simulation of tokamak plasma turbulence from edge to core. Image credits to G. Dif-Pradalier - CEA-IRFM, France



Geothermal Energy: Simulation results of potential borehole heat exchanger field in Geilenkirchen-Neuteverren
Image credits to J. Niederau et al., RWTH-Aachen, Germany



Hydropower: High-resolution river discharge modeling. Image credits to B. Naz and S. Kollet et al. - FZJ, Germany

EoCoE: goals

- Enable modelling breakthroughs in renewable energy domains
- Foster digitalization in energy technologies to reduce greenhouse gas emissions
- Apply state-of-the-art cutting-edge mathematical and numerical methods, algorithms and visualisation tools to re-engineer modeling applications for exascale computing platforms
- Establish a single “stop-shop” to effectively exploit simulation codes
- Encourage HPC best-practices and reduce the skills gap in HPC competencies
- Support Europe to improve its competitiveness in carbon-free energy production through the use of HPC
- Improving the know-how in applying European software tools and methods for exascale computing

EoCoE: approach

The Centre of Excellence is committed to delivering performance enhancements for a selection of established codes in energy research. To achieve this, a series of instruments will be deployed

- Performance analysis workshops
- Collaborative platforms for application development and dissemination
- Open Software-as-a-Service (SaaS) portal offering HPC services
- Interdisciplinary approach whereby the technical expertise complements the scientific challenge in an effective organizational grid
- Exascale transversal team ensuring a multidisciplinary approach to co-design software development