CRESCO (Computational RESearch centre on COMplex systems) is the ENEA infrastructure for scientific computing. It serves a national community of applied researchers working in collaboration with academic and industrial partners. The centre aims at supporting and strengthening the use of existing facilities for R&D, and at promoting the upgrade of equipment and technologies for the analysis and diagnostics of materials and components, in the framework of transport policies. Its targets, perfectly consistent with the mission of ENEA and the specific programmes of the technical units involved, are:

- to strengthen hardware facilities and technical know-how in support of the national productive system, by upgrading the already operating laboratories and starting-up new ones;
- to create a national centre for advanced diagnostics and 3D characterization of materials and surfaces of interest for transport policies;
- to support and develop technologies for the production of materials and surfaces used in transport;
- to promote the identification and synthesis of new materials for catalysts and electrodes for batteries, replacing old critical materials;
- to foster the development of new technologies for energy-saving light sources, lighting systems, traffic signs, etc. in the framework of transport policies;
- to promote IT technologies for the management and the remote access of complex experimental facilities, modelling, simulation and experimental data mining.

The CRESCO HPC Environment

**Our Linux Clusters**

CRESCO1 (~ 20 TFlops)
- 64 nodes/double socket equipped with
  - 12 cores AMD Opteron 6234™
  - CPUs running @ 2.4 GHz, 64 GB RAM
  - 96 GB SATA II disk
  - 2 Gbehetnet interfaces

CRESCO2 (~ 100 TFlops)
- 144 nodes/double socket equipped with
  - 16 cores Intel E5-2670™
  - CPUs running @ 2.4 GHz, 64 GB RAM
  - 96 GB SATA II disk
  - 10 Gb 40 GB/s interface
  - 2 Gterednet interfaces

CRESCO4 Special Section (~ 17 TFlops)
- 5 nodes w/ large RAM
  - >768 GB, 2 x 6 cores Intel E5-2643v2™ (Ivy Bridge)
  - CPUs running @ 3.5 GHz
- 4 nodes Intel Phi & Nvidia K40M
  - >64 GB, dual Intel E5-2660v3™
  - >5 PHI 5110P (80 cores,1TFlops) boards
  - >3 Nvidia K40M (143 TFlops) boards

CRESCO5 (~ 25 TFlops)
- 40 nodes/double socket equipped with
  - 16 cores Intel E5-2630v3™
  - CPUs running @ 2.4 GHz, 64 GB RAM

The latter machine is mainly devoted to run licensed applications, such as ANSYS, NASTRAN, etc., while non-licensed ones are run with lower priority.

**Computational Research Areas**

- **Computational Fluid Dynamics for Combustion**
- **Computational Fluid Dynamics for Aerospace**
- **Computational Chemistry**
- **Climate Simulations**
- **Diffusion of polluting substances in the atmosphere**
- **Nuclear technologies**
- **Physics of nuclear fusion**
- **Biophysics**
- **Complex networks**

**CRESCO EDOC** (for further info see http://cresco-edoc.brindisi.enea.it)

The CRESCO Education on Cloud (EDOC) project promotes and fosters the diffusion among the new generations of a cultural background oriented towards computational sciences and IT. The aim of the project is to let high school students use knowledge in information and communication technologies and to train them via a practical approach on a computational system, namely CRESCO EDOC, dedicated to high performance computing and tailored to meet their requirements. The project addresses the need for developing new approaches to school didactics, capable of responding to the challenges of our modern societies, and new teaching models profiting from the scalability and elasticity provided by cloud technologies. CRESCO EDOC was born in the framework of the research project EDOC WORK3.0 (Education and Work on Cloud), financed by the Italian Ministry for University and Research (MIUR) through the contract PON Ricerca & Competitività 2007–2013.

**ENEA-CINECA agreement for EUROFUSION**

The main HPC institution in Italy is CINECA with its PFlops size systems, while ENEA and a few other institutions have HPC resources in the order of 100 TFlops. In order to improve the collaboration in the Italian HPC world, recently an agreement was signed between ENEA and CINECA to promote joint activities. In this framework CINECA and ENEA participated successfully to a procedure launched by EUROFusion, the European Consortium for the Development of Fusion Energy, for the procurement of a several PFlops HPC system. The ENEA-CINECA proposal won the competition against other 7 institutions. On July 1st, 2016, a new machine Marconi-Fusion, with 1 PFlops computational power, started its operations. An upgrade is foreseen for next year, when the total computational power will be pushed to about 5 PFlops.