Project title:	EXA2GREEN - Energy-aware sustainable computing on future technology – paving the road to exascale computing
In brief	Improving energy efficiency in high performance computing

Short summary

Energy-aware sustainable computing on future technology – paving the road to exascale computing, -Exa2Green-, is a research project co-financed by the European Commission under the 7th Framework Programme. It is part of the 'FET (Future and Emerging Technologies) Proactive Initiative: Minimising Energy Consumption of Computing to the Limit'.

In the Exa2Green project, an interdisciplinary research team of HPC experts, computer scientists, mathematicians, physicists and engineers from Germany, Switzerland and Spain takes up the challenge to develop a radically new energy-aware computing paradigm and programming methodology for exascale computing.

Power consumption of modern High Performance Computing (HPC) systems has become the major challenge on the road to systems that deliver performance in the range of 10^{18} operations per second (exascale computing) and for global efforts towards greener IT. The great potential of transforming and completely re-designing algorithms implemented in the applications on HPC systems remains so far unexplored.

Exa2Green will develop new energy metrics which will form the first steps towards the limits of minimum energy consumption for a given simulation problem and development of an advanced power consumption monitoring and profiling in order to minimize the energy consumption. It will also develop of new smart algorithms using energy-efficient software models which strive for minimal energy consumption on hardware and development of a smart, power-scheduling technology like maintaining homogeneous heat dissipation for High Performance Clusters. To provide a proof of concept for the methodologies and technologies developed in the Exa2Green project. The COSMO-ART weather forecast model will serve as a highly relevant example of an intensive simulation, whose energy profile is currently far from optimal.

Contact:

Prof. Vincent Heuveline, Coordinator of Exa2Green

vincent.heuveline [at] iwr.uni-heidelberg.de

www.exa2green.eu

Key words:	Green computing, high performance computing, power wall, exascale computing, COSMO-ART