Towards a sustainable energy mix

Energy consumption is expected to increase dramatically over the next 50 years as the world's population grows and developing countries become more industrialised. With environmental requirements for zero or low CO_2 emission sources and the need to invest in a sustainable energy mix, new energy sources must be developed. Fusion will be available as a future energy option by the middle of this century, and could contribute to a sustainable, secure and safe energy mix.

Growing global energy needs

Despite the growing global energy needs, public funding of energy R&D worldwide is half of what it was in 1980 in real terms: today, it is less than 0.2% of the world's expenditure on energy. Massive investment is therefore necessary. For example, around 1 trillion EUR will be needed by 2020 to modernise infrastructures to cater for low carbon energy.

Although the European Union (EU) brings together 500 million consumers who consume one-fifth of the global energy production, it currently imports more than 50% of its energy, in particular for oil (85%), and gas (65%), from outside. With current trends, it is predicted that by 2030 the EU will depend on imported energy for 70% of its total needs. The EU had an energy trade deficit of 400 billion EUR in 2008, a typical year, or 800 million EUR per day.

A broader energy mix is necessary

Oil, coal and gas account for more than 80% of the world energy production. These fossil fuels are the largest source of CO_2 emissions – the chief cause of global warming. Renewables (wind, wave, solar, hydro) offer long-term, clean energy reserves but they have a low energy density, leave a large environmental footprint and their fluctuatations in time require storage systems and back-up power plants. Nuclear fission offers a proven alternative but generates long-lived radioactive waste that requires transportation and re-processing.

According to the Eurobarometer survey, 82% of Europeans acknowledge that the way they consume and produce energy has a negative impact on climate. At the same time, 50% perceive climate change as one the most serious problems our world faces and call for immediate action. A balanced energy mix, including renewable technologies, will be necessary to satisfy future needs. We must develop new sustainable energy sources that can deliver continuous, large-scale power for the long-term without harming the environment.

Fusion is part of the energy solution

Fusion energy has the potential to provide a sustainable solution to European and global energy needs. Fusion could start providing commercial electricity in about 30 years, and it has the potential to supply up to 20% of the world's energy by the year 2100. Its advantages include not emitting any CO_2 greenhouse gases, efficient energy, abundant fuel sources, safe systems and no long-lived radioactive waste.