



*Prepared for the IIPS Symposium on*

# **Globalization and Japan's Science and Technology Strategy**

19 – 20 November 2007

Tokyo

Session 1  
Monday, 19 November 2007

## **The European Research and Innovation Area: Setting the pace for global Europe**

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## **The European Research and Innovation Area:** **Setting the pace for global Europe**

In a changing world characterised by the accelerating globalisation of research and innovation and the emergence of new scientific and technological powers, the European Research and Innovation Area is more than ever a cornerstone for a European knowledge society. Such a society is one where research, education, training and innovation are fully mobilised to fulfil the economic, social and environmental ambitions of the EU and the expectations of its citizens.

The European research and innovation area concept combines: a European "internal market" for research, where researchers, technology and knowledge freely circulate; effective European-level coordination of national and regional research activities, programmes and policies; and initiatives implemented and funded at European level. The European Research and innovation Area that the scientific community, business and citizens need should have the following features:

- An adequate flow of competent researchers with high levels of mobility between institutions, disciplines, sectors and countries;
- World-class research infrastructures, integrated, networked and accessible to research teams from across Europe and the world;
- Excellent research institutions engaged in effective public-private cooperation and partnerships, forming the core of research and innovation 'clusters' including 'virtual research communities', mostly specialised in interdisciplinary areas and attracting a critical mass of human and financial resources;
- Effective knowledge-sharing notably between public research and industry, as well as with the public at large;
- Well-coordinated research programmes and priorities, including a significant volume of jointly-programmed public research investment at European level involving common priorities, coordinated implementation and joint evaluation; and
- A wide opening of the European Research Area to the world with special emphasis on neighbouring countries and a strong commitment to addressing global challenges with Europe's partners.

Some progress has been made since the concept was endorsed at the Lisbon European Council in 2000. The European research and innovation area has become a key reference and many initiatives have been launched in Europe over the last years, notably:

- The EU Research Framework Programme is explicitly designed to support the creation of ERA and its funding has been substantially increased. New initiatives launched in conjunction with the 7<sup>th</sup> Framework Programme (2007-2013), such as the European Research Council, will have an important impact on the European research and innovation landscape. The future European Institute of Technology also has the potential to play a substantial role in creating world-class 'knowledge and innovation communities'.
- Initiatives have been launched to improve the coordination of research activities and programmes. They include the European Technology Platforms, through which industry and other stakeholders develop shared long-term visions and strategic research agendas in areas of

business interest, and the bottom-up 'ERA-Net' scheme which supports the coordination of national and regional programmes.

- Policy coordination is addressed through the 'open method of coordination' and the use of voluntary guidelines and recommendations. This is stimulating a process of debate and reforms at national level, which has resulted in all Member States setting national R&D investment targets in the context of the overall EU 3% of GDP R&D investment objective and taking measures to improve their research and innovation systems.
- The EU has adopted a 'broad-based innovation strategy', which will improve the framework conditions for research and innovations<sup>5</sup>. In this context, a modernised Community framework for State aid for research and innovation<sup>6</sup> and guidance for a more effective use of tax incentives for R&D were adopted in November 2006, a European patent strategy is being proposed to overcome the deadlock on the Community patents, and initiatives are being prepared to support the emergence of European 'lead markets' in promising technology-intensive sectors.
- EU cohesion policy and its financial instruments - the Structural Funds - give strong priority to the development of research and innovation capacities, particularly in less developed regions. Together with the priority given in most Member States' internal policies, this can help the whole of Europe to participate in and derive full benefit from the European Research Area.

These initiatives are valuable steps on which further progress can be built. But much ground work remains to be done to build the European research and innovation area, particularly to overcome the fragmentation which remains a prevailing characteristic of the European public research base.

- Researchers still see career opportunities curtailed by legal and practical barriers hampering their mobility across institutions, sectors and countries.
- Businesses often find it difficult to cooperate and enter into partnerships with research institutions in Europe, particularly across countries.
- National and regional research funding (programmes, infrastructures, core funding of research institutions) remains largely uncoordinated. This leads to dispersion of resources, excessive duplication, unrealised benefits from potential spillovers, and failure to play the global role that Europe's R&D capability would otherwise allow, notably in addressing major global challenges.
- Reforms undertaken at national level often lack a true European perspective and transnational coherence.
- Fragmentation of public research diminishes Europe's attractiveness for business as a location for R&D investment.

A sense of urgency in revisiting the European research and innovation area stems from the fact that globalisation of research and technology is accelerating. These developments bring new opportunities for Europe and the world. Science knows no boundaries and the issues that research and innovation are asked to deal with are increasingly global. The European research and innovation area should therefore be open to the world. A coherent approach towards international

S&T cooperation, under the banner of global sustainable development, can assist in building bridges between nations and continents. A success story such as ITER shows that Europe can have the will and capacity for leadership to address global challenges with partners around the world. In other areas such as the environment, Europe is increasingly involved in global initiatives.

In recent years the response to globalisation has moved to the heart of the EU policy agenda. The relaunch of the Lisbon Strategy in Spring 2005 put Europe back on track to face up to competition as the touchstone for creating growth and jobs in the modern global economy. In their informal meeting at Hampton Court in October 2005, the Heads of State and Government set out the key challenges posed by globalisation in areas like innovation, energy, migration, education and demography.

At the Spring European Council in 2006, it was agreed to move up a gear in the work of the renewed Lisbon strategy for growth and jobs to spearhead the response of the European economy. The Lisbon strategy for growth and jobs can continue to provide the backbone for a European approach to globalisation. The four priority areas agreed by the 2006 Spring European Council provide the right frame for the Strategy at both EU and national level:

- More R&D and innovation: Globalisation has stepped up the pace of change for technology and for ideas. The emphasis in this area has been on increasing R&D expenditure and Member States are making progress towards the 3% GDP target. All Member States have set national targets; the challenge for public and in particular the private sector is to meet them. But investment alone will not guarantee an improved R&D performance. We need a market which cuts the lead time to transform innovation into new products and services. Europe needs the right conditions for research and innovation to flourish – such as attractive careers for researchers, a modern IPR system and interoperable standards. A knowledge economy needs free movement for ideas and researchers, adding a "fifth freedom" to the four freedoms of the Internal Market and creating a genuine European Research Area.
- A more dynamic business environment: SME and entrepreneurship has been put high on the reform agenda. The task now is to fully unlock the growth and jobs potential of SMEs and make full use of their innovative capacities. The Commission will seek the views of SMEs and their representatives to help design a "Small Business Act" for Europe with a view to making a wide range of proposals to support SMEs by the end of 2008.
- Greater employability and investment in people: Both globalisation and technological change risk increased inequality, opening up the gap between the skilled and the unskilled. The best solution is to help each individual to adapt, by improving the quality and availability of education and training for all ages. There is a growing interest in "flexicurity." This can help people to manage employment transitions more successfully in times of accelerating economic change. By upgrading their skills, and protecting people rather than particular jobs, it helps people to move into better paid, more satisfying jobs, or even start their own businesses.

- Energy and climate change: The ambitious targets set by the European Union to cut greenhouse gas emissions and drive low-carbon energy are based on two key foundations: a conviction that, with mechanisms like trading to let the market lead the process, fundamental change is within our economic reach; and confidence that there has been a real sea change in citizens' commitment to reform. At the same time, this ambitious approach provides the best possible platform for international negotiations to tackle climate change worldwide. The Lisbon strategy can promote a new ecological approach to industrial and innovation policy – to stimulate and mainstream sustainable and environmentally-friendly technologies.

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The climate change and energy challenge is particularly important as the future of the planet depends on the response of governments and societies. The response will call for a significant mobilisation of the scientific community. The research efforts committed to deal with this challenge will depend not only on the credibility of the technological responses but also on the rhythm of adaptation and the suitability of solutions introduced by societies and their political, economic and social actors.

The European Union has made the fight against climate change one of its main objectives for action. The stakes are crucial. Without changes in the current situation, energy demand will increase by 50% by 2030 and result – combined with the increase in world population – in a doubling of CO<sub>2</sub> emissions, accelerating global warming with a whole series of uncontrollable consequences that will affect the living conditions of the world population.

At the European Council in March 2007, the Union adopted the strategic objective to limit global warming to no more than two degrees Celsius above pre-industrial levels. It set the 3 times "20 objectives" for 2020: -20% greenhouse gas emissions, +20% improvement in energy efficiency, with 20% coming from renewable energy sources. The Union's aim is that by 2050, the developed countries will have reduced their emissions by 60-80%.

Research and innovation are concerned at multiple levels through providing new knowledge, new technologies and new concepts. It is instrumental at the level of problem analysis and related solutions, in the policy-making process and in the economy and society at large. Research and innovation are important elements in the success of the three objectives set by the Union:

- Reduction of greenhouse gas emissions by 20% by 2020, and in case of a global and comprehensive agreement, by 30%, and call for a global reduction of up to 50% by 2050 compared to 1990 levels. Research and technological innovation have a strong bearing on the process, methods, technologies, materials which allow a reduction in the negative impacts of energy production and consumption on the climate and environment particularly through: Power stations (e.g. capture of CO<sub>2</sub>, advanced reactors); Energy Intensive Sectors (steelworks, cement works, chemical/paper/aluminium industries); and Transportation (air, water, rail, road).

- Increase in energy efficiency with a view to saving 20% of EU energy consumption compared to projections for 2020. Research and innovation here are concerned with such issues as energy efficiency of transportation (air, water, rail and road) and the efficiency of heating and lighting in buildings and homes.
- Renewable energy: 20% of the total energy consumption in 2020 should come from renewable energies, including a minimal proportion of 10% of biofuels in the total petrol and diesel consumption for transport. Research and innovation cover the improvement in the efficiency of alternative energy technologies (solar, wind, biofuels) resulting in a reduction in their cost to encourage them to be used more widely, new fuel sources (new generation of bioethanols).

Research and innovation, in general, are preparing for the setting-up in the medium to long term of a low carbon economy and society in all its economic, social, and technological dimensions, by looking at the implications of the transition for the different sectors and in particular for the energy-intensive sectors such as the iron and steel industry, chemical industry, transport and agriculture. Research also covers new energy sources (hydrogen, thermonuclear fusion, etc), while at the same time addressing new generation nuclear fission reactors.

Most of the EU 7<sup>th</sup> Research Framework programme themes are already largely driven towards the achievement of sustainable development objectives, which cover climate change as a top priority. The FP7 budget allocated for research, energy and transport has been increased and amounts to EUR 8.4 billion for the period 2007-2013. But the contribution of research to the CCE challenge goes beyond these three areas. Indeed, the contribution includes all research aiming at moving towards a low-carbon economy and diminishing the other greenhouse gas emissions. This includes agricultural research, ICT research, materials research, social sciences & humanities, spatial research, nuclear research (fission and fusion), science in society, and research infrastructures.

As to the implementing instruments, European research is strongly committed to reaching the objectives set by the European Union, notably:

- Of the 34 European technology platforms, 15 focus on energy/climate change questions: aeronautics, advanced engineering materials construction, biofuels, rail road, steel, electricity networks, wind energy, hydrogen and fuel cell, photovoltaics, sustainable chemistry, waterborne, zero emission fossil fuel power plants, forestry. A further related platform in the energy field, the Sustainable Nuclear Energy Technology Platform is in preparation.
- Of the active ERANETS, 14 are working on the climate change - energy challenge: renewable energies, zero emission power plants, hydrogen and fuel cells, solar photovoltaic, innovative energy, sustainable businesses, sustainable buildings, climate change, sustainable urban environment, road research, efficient transport systems, cooperation with South America, China, and South-East Europe.
- The objective of the Fusion part of the Euratom programme in the near term is the successful realisation of the ITER project and preparations for the earliest possible start of the experimental demonstration activities.

- Of the six Joint Technology Initiatives (JTIs), 2 are directly related to the CCE challenge, i.e. "Hydrogen and Fuel Cells Initiative" and "Clean Sky", and two are closely linked: "Nanoelectronics Technologies 2020" and "Global monitoring for Environment and security". The "Clean Sky" JTI in particular aims at developing environmentally friendly technologies in the EU air transport sector. The target is to reduce CO<sub>2</sub> emissions from planes by 50% in 2020 through drastic reduction in fuel consumption (improvement of engine efficiency and aircraft operation).
- The Earth Observation activity (GEO) is strongly "climate change impacts" oriented and it is expected to provide essential information for the understanding and prediction of climate change.
- In the area of research infrastructures, the Sixth Framework Programme set up "Integrated Infrastructures Initiatives" (for airborne environmental research, for atmospheric processes, research on atmospheric aerosols, characterisation of the European terrestrial biosphere) to support research in the area of climate change. In the roadmap established by ESFRI for FP7, 7 of the preparatory phase projects are directly linked to climate change.

The global dimension of the challenge related to climate change has initiated a number of international research efforts and collaborations, in which Europe has played and continues to play a key role. International co-operation for research and technological innovation is crucial and can have many benefits, including exchange and sharing of knowledge, skills, and providing effective and equitable responses on the scale required.



It is clearer than ever that the EU can only achieve its objectives at home by being active and united on the global stage. The Lisbon Strategy for Growth and Jobs is the right backbone for the European response to globalisation. Its further deepening is the way to create the wealth that can give practical meaning to core European values of social inclusion and of European and international solidarity. As globalisation is constantly evolving, Europe must ensure that its external and internal policies are mutually reinforcing and be ready to refine them.

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This text is based in particular on:

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European Commission Green Paper 'The European Research Area: new perspectives', 4 April 2007, [http://ec.europa.eu/research/era/pdf/era\\_gp\\_final\\_en.pdf](http://ec.europa.eu/research/era/pdf/era_gp_final_en.pdf)