



The EU Framework Programme
for Research and Innovation

HORIZON 2020

*Excellent Science
Competitive Industries
Better Society*

EU Research and Innovation: Tackling Societal Challenges

Finding solutions for societal challenges - such as public health, clean transport and affordable energy - is a key objective of EU research policy. Turning innovative ideas and breakthroughs into new products and services also helps European competitiveness, growth and jobs.

*Research and
Innovation*

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1. Introduction : Research and Innovation within the European Union

Research and innovation contribute to making Europe a better place in which to live and work. They improve Europe's competitiveness, boosting growth and job creation. At the same time, research and innovation help make people's lives better by improving things like healthcare, transport and digital services.

In January 2014 the European Union will launch **Horizon 2020**. It will be the biggest EU research and innovation programme ever, with a budget of around €79 billion (adjusted for inflation) over the seven years of the programme (2014-2020). **Horizon 2020** will place more emphasis than ever on making sure that Europe's great ideas get from the laboratory to the market.

As European Research, Innovation and Science Commissioner Máire Geoghegan-Quinn has said: "Knowledge is the currency of the global economy. If Europe wants to continue to compete in the 21st century, we must support the research and innovation that will generate growth and jobs, now and in the future. The high level of competition for EU funding makes sure that taxpayers' money goes to the best projects that tackle issues that concern all of us".

For key data on the research and innovation landscape in your country, please consult the following link:

<http://tinyurl.com/cghra6v>

2. More jobs, improved lives, better society

EU Research and Innovation can help to exit the current economic crisis

With an ageing population and strong competition from emerging economies, Europe's future economic growth and job creation must come from innovation in products, services and business models. There is strong evidence that countries that have historically invested most in research and innovation have outperformed those that have invested less.

<http://tinyurl.com/pzb3tqk>

The European Union has set itself the 2020 target of investing 3% of GDP in research and innovation, across the public and private sectors combined.

This tangible investment in a healthy, competitive European economy is every bit as important as our commitment to European debt and deficit reduction. Spending 3% of EU GDP on research and development by 2020 could create 3.7 million jobs and increase annual GDP by close to €800 billion by 2025. Europe is currently spending less than the US and Japan every year on research and innovation.

Investment in research and innovation has a powerful multiplier effect, especially at the European level. Every €1 invested by the EU research programme generates on average €13 in increased value added for the business sector¹.

Towards an Innovation Union

This is why innovation has been placed at the heart of the EU's 'Europe 2020' strategy for growth and jobs. The goal is to make the European Union an 'Innovation Union' by creating the right conditions for more innovation in Europe.

For example, an EU patent was agreed in 2012 with the aim of saving companies and inventors up to 80% of the cost of a patent. When implemented, the agreement will mean inventors and entrepreneurs will be able to get one single European patent instead of having to apply for one in each EU country. The European Commission and the European Investment Bank Group are also working together to help innovative SMEs access finance from commercial banks.

¹ Source: H2020 impact assessment of the effects of the Sixth and Seventh Framework Programmes on the growth of total factor productivity of the EU and associate countries.

Direct investment remains vital as well, and **Horizon 2020** will be the biggest EU research and innovation programme ever, and one of the biggest publicly funded worldwide. There is a clear commitment to widen participation in the future, including more small and medium-sized enterprises (SMEs).

By supporting projects and ideas that boost competitiveness as well as tackle societal issues such as human health and protecting the environment, European research and innovation policy contributes to the individual and collective well-being of citizens.

Given the complexity, cost and critical mass considerations linked to high-level research, hardly any single research team, research laboratory or company can respond to these challenges alone. Member States find it increasingly difficult to go it alone in the many important areas of scientific and technological advancement.

Organising co-operation at different levels, coordinating national or European policies, networking teams and increasing the mobility of individuals and ideas are therefore fundamental requirements for research in a globally competitive environment.

Creating a better society

By 2050, the world population may reach nine billion people, and two fifths of that population will be over 50 years old. Three quarters of the global population will live in cities, and over 60% will live in small households - alone or with just one other person.

These profound demographic changes will take place in the course of just a few decades. How can we find sustainable solutions to problems such as energy supplies, global warming, public health, security or water and food resources?

Investing in quality and relevant research and technological development is the key to supporting resource efficiency and diversity, protecting the environment, combating poverty and social exclusion... in short, to creating a better society for citizens.

The fact sheets contained in this brochure give an overview of the key societal challenges facing European citizens and examples of how EU funding for research and innovation is providing solutions to help create a better sustainable society. The examples are drawn from the current and previous EU research programmes, the 'Framework Programmes'. The most recent, FP7, with a budget of nearly €55 billion, has funded some 18,500 projects involving 100,000 participants.

3. Tackling societal challenges

EU support for research and innovation helps drive international projects across the European Union and beyond, and promote the progress of knowledge and technology. One of the three key pillars of **Horizon 2020** will be tackling societal challenges that are important to all of us. These are:

- Health, demographic change and well-being;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- Europe in a changing world - inclusive, innovative and reflective societies;
- Secure societies – protecting freedom and security of Europe and its citizens

1. Health, Demographic Change and Wellbeing



The Importance of Health

Health is wealth, as the old saying goes. True not only for individuals but also for us all; a healthy workforce is a prerequisite for a healthy economy and a healthy population means lower public health bills.

Yet many challenges need to be addressed to grant everybody's legitimate wish for a long, happy and healthy life.

For instance, as Europe's population ages, brain disorders such as neurodegenerative diseases become an increasing burden. The cost to EU society of cerebral disorders was estimated by experts to be around €800 billion in 2010. To date, one sixth of EU health research has been invested in leading international brain research to combat diseases such as Alzheimer's, depression, or schizophrenia which affect millions of Europeans.

Antimicrobial resistance is another big challenge. More than 25,000 patients in the EU die each year from infections caused by drug-resistant bacteria. Last-line antibiotic-resistant germs are now found regularly in many hospitals in the EU.

Responding to these challenges, EU research and innovation is an investment in our health as it will keep older people active and independent for longer, it will support the development of new, safer and more effective interventions and will help health and care systems to remain sustainable. It will improve the prevention and treatment of chronic and infectious disease, the prediction and management of pandemic threats and will help to fight antimicrobial resistance.

The return on this investment will include new ways to prevent disease, better diagnostics and more effective therapies, as well as the uptake of new models of care and new technologies promoting health and wellbeing. These rely on a better understanding of the fundamental nature of health and disease, and of the means by which to promote the former and prevent and treat the latter.

What is EU Research and Innovation doing to support Health and Wellbeing?

EU health research promotes lifelong health and wellbeing for all and the competitiveness of European health-related industries.

By the end of 2013, EU research will have financed 996 international health research projects, with more than 10,000 participants, from 123 countries and with an SME participation of 16%.

Supporting research in the area of health is therefore of crucial importance and focuses on:

- Fostering good health in ageing Europe: promote healthy ageing and prevent disease throughout the lifespan by tackling key issues (nutrition, physical activity, alcohol, drugs and tobacco consumption, environmental risks, accidents at work, in traffic or at home, etc.).
- Protecting citizens from health threats: combat pandemics or biological incidents and address the threat of bioterrorism and climate change.
- Supporting dynamic health systems and new technologies: e-health, genomics and biotechnologies revolutionise healthcare and health systems, lower costs and contribute to their future sustainability support and the shift from hospital care to prevention and better citizen-centred care.

This societal challenge will continue to be supported under the future research and innovation programme **Horizon 2020**.

For the very latest information on European Research and Innovation, go to:

<http://www.facebook.com/innovationunion>
<http://twitter.com/innovationunion>

Draw and play keeps Parkinson's at bay

In Europe there are around 75,000 new cases of Parkinson's disease every year. Early diagnosis is key to offering patients better advice, monitoring and rehabilitation. A revolutionary pen designed by the DiPAR European project aims to do just that. It has been designed to help to identify the elusive early stages of the disease by measuring muscle activity when volunteers move their arms while drawing.

The writing patterns of both Parkinson's patients and healthy subjects are compared. Those patterns, scientists say, can possibly help them to determine if a patient is suffering from Parkinson's disease or from other less dramatic neurological disorders.

Supported by a €1.37 million contribution from the EU 7th Framework programme, DiPAR includes 9 partners from 5 Member States.

Project coordinator: Fraunhofer, Germany

Country participants: Germany, Finland, Netherlands, Spain, UK

For more information:

- DiPAR success story and video: <http://tinyurl.com/mdxzszst>
- Contacts: <http://tinyurl.com/oqs27fq>

Unlocking the science behind hunger

Over the past two decades, obesity levels in Europe have been steadily increasing, tripling between 1990 and 2006, according to World Health Organization (WHO) statistics. Europeans are becoming more obese year on year which has consequences not only for citizen health but for the European healthcare system and economy. Researchers have struggled to explain the physiological effects of appetite on obesity and now the 'Nutrient Sensing In Satiety Control and Obesity' (NUSISCO) project has provided new insights into this complex relationship. The results are expected to help businesses develop foods and diets that are better adapted to body weight control.

Supported by a €1.65 million contribution from the EU 6th Framework programme, NUSISCO includes partners from 4 Member States.

Project coordinator: Institut National Agronomique Paris, France

Country participants: Germany, Netherlands, UK

For more information:

- NUSISCO success story: <http://tinyurl.com/okugluj>
- Contacts: <http://tinyurl.com/p79pfvg>

Tuberculosis - an enemy that dies hard

Once known as 'consumption' for the way it 'consumed' the lungs and sometimes other organs, tuberculosis (TB) is one of the oldest known infectious diseases. Someone dies from it every 15 seconds and 30 million more people will succumb to this deadly bacterium in the coming decade if new treatments are not found.

Thanks to significant public and private funding, the 'New medicines for tuberculosis' (NM4TB) project run an ambitious drug-discovery project that combines some of Europe's leading academic TB researchers with a major pharmaceutical company and three small and medium-sized enterprises (SMEs) – all with a strong commitment to discovering new anti-infective agents.

They have already identified novel approaches to identify and validate targets for potent new TB drugs capable of cutting treatment time while combatting persistent bacilli and multi-drug resistant strains.

Supported by a €11.1 million contribution from the EU 7th Framework programme, NM4TB included partners from 9 Member States.

Project coordinator: Ecole Polytechnique Federale de Lausanne, Switzerland

Country participants: Denmark, France, Germany, Hungary, India, Italy, Russia, Slovenia, South Africa, Spain, Sweden, UK

For more information:

- NM4TB success story: <http://tinyurl.com/prlmbga>
- Contacts: <http://tinyurl.com/prlmbga>

2. Food Security, Sustainable Agriculture, Marine, Maritime and Inland Water Research, and the Bioeconomy



The Importance of the Bioeconomy

Eating well, wasting less and knowing the origin of the food you buy for yourself and your family: these are all issues of concern to European citizens. And, with the world population moving towards nine billion by 2050, dwindling fossil and food resources, increasing environmental pressures and climate change, Europe needs to radically change its approach to production, consumption, processing, storage, recycling and disposal of biological resources.

The bioeconomy holds the key to this shift towards a new, post-petroleum society encompassing sustained changes in lifestyle and resource use that cut across all levels of society and the economy. The welfare and well-being of Europe's citizens and that of future generations will depend on how these transformations are made.

The European bioeconomy is already worth €2 trillion and provides 22 million jobs (accounting for 9% of total employment in the EU) and has the potential to reinvigorate communities in some of our most peripheral and deprived areas.

Food and feed security and safety, the competitiveness of the European agri-food industry and the sustainability of food production, supply and consumption including fisheries and aquaculture must be addressed, covering the whole food chain and related services, whether conventional or organic, from primary production to consumption.

What is EU Research and Innovation doing to support the Bioeconomy?

It is estimated that every euro invested in bioeconomy research and innovation will generate approximately €10 in value added while also contributing to the goal of moving to a low-carbon economy.

By the end of 2013, EU research will have financed over 495 bioeconomy research projects, with more than 7,402 participants, from 105 countries and with an SME participation rate of over 21%.

Research funding brings together science, industry and other stakeholders working towards the common goals of:

- Achieving food safety for all Europeans and decreasing the burden of food- and diet-related diseases by promoting the shift towards healthy and sustainable diets, via consumer education and innovations in the food industry.
- Addressing the pressures on natural resources such as the decline in fossil fuels, depletion in fish stock as well as combating climate change through reducing greenhouse gas emissions and the adaptation of the agricultural sector accordingly.
- Improving animal health to control infectious diseases and zoonoses (infectious diseases that can be transmitted from animals to humans).
- Improving food management to reduce food waste by 50 % by 2030.

This societal challenge will continue to be supported under the future research and innovation programme **Horizon 2020**.

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<http://www.facebook.com/innovation.union>

<http://twitter.com/innovationunion>

Managing food risk information in an online world

Food scares can undermine consumer confidence, ruin business reputations and create unnecessary panic. The FOODRISC project focused on the role played by social media during a range of food crisis events has been both novel and in-depth. Crises covered have included the Irish dioxin crisis of 2008, the German dioxin crisis and E. coli outbreak of 2011 and, most recently, the horse-meat scandal of 2013. The results obtained will now feed into the development of new online tools for more effective communication Europe has surpassed the US in the use of social media. Online communication has a vital role to play in ensuring food safety, a research priority of the **Horizon 2020** Framework Programme for research and innovation.

The FOODRISC project will receive just under €3 million in funding from the EU's 7th Framework programme.

Project coordinator: University College Dublin, Ireland

Country participants: Belgium, Germany, Spain, Italy, Latvia, The Netherlands, Portugal, UK

For further information:

Project website: <http://www.foodrisc.org/>

Contacts: <http://tinyurl.com/nylssvk>

Improving biowaste treatment to produce higher quality products

This SME-targeted project aims at improving currently used biowaste treatment systems and move towards advanced, efficient and comprehensive nutrient recovery process with zero emission performance to produce high-quality compost and biochar. The targeted, high-quality output products will contribute to reduce mineral fertilisers in agriculture, enhancing the environmental, ecological and economical sustainability of crop production, reduce the negative footprint of cities, and contribute overall to climate change mitigation. In this context, the improved REFERTIL biowaste treatment process opens new technical, economic, environmental and social improvement opportunities, while improving the use, effectiveness and safety of the resulting compost and biochar products in agriculture

The REFERTIL project will receive just under €3 million in funding from the EU's 7th Framework programme.

Project coordinator: Terra Humana, Hungary

Country participants: Denmark, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Slovenia, Spain, United Kingdom

For further information:

Project website: <http://tinyurl.com/kosrpbh>

Contacts: <http://tinyurl.com/ats7gzj>

3. Secure, Clean and Efficient Energy



The Importance of Energy

Lighting, heating, transport, industry... without energy, we would have none of these essential day-to-day services. Energy drives our modern economies and it does indeed take a huge amount of energy to maintain the standard of living to which most of us have become accustomed in Europe.

Europe, the number two world economy, is currently over-dependent on the rest of the globe for its energy. With few energy reserves of its own, the EU has to import over half of its energy requirements making it the world's largest energy importer, consuming one fifth of the planet's reserves.

This dependence on energy imports combined with increasing energy prices and the serious negative environmental impact of high energy consumption all add up to one of the greatest challenges facing Europe today. Energy-related emissions account for almost 80% of the EU's total greenhouse gas emissions that in turn contribute to global warming. We are consuming far more than we can afford in every sense of the term, putting our security, competitiveness and employment in jeopardy.

It is essential then for the EU to spark a new industrial revolution that will deliver a low-energy economy, whilst making the energy we consume to maintain our standard of living and modern conveniences more secure, competitive, affordable and sustainable.

What is EU Research and Innovation doing to support Energy?

A common EU energy policy has evolved around the common objective of ensuring the uninterrupted physical availability of energy products and services on the market, at a price which is affordable for all consumers (private and industrial), while contributing to the EU's wider social and climate goals.

The main implementation activities for 2013 give priority to smart cities and communities, renewable energies (bioenergy, solar, wind, ocean, hydro, geothermal energy), smart energy grids as well as carbon capture and storage.

By the end of 2013, EU research will have financed at least 303 energy research projects, with more than 2,200 participants, from 64 countries and with an SME participation rate of 15.3 %.

Energy is the life blood of our society. To ensure that it keeps flowing, EU Research and Innovation is focused on:

- Efficient use of energy that translates into 20% savings by 2020: the equivalent of between €5 billion and €10 billion saved and channelled back into the economy, and up to two million jobs created.
- Ensuring the free movement of energy: create a more integrated, interconnected and competitive market that will benefit citizens.
- Secure, safe and affordable energy for citizens and businesses: a well-functioning, integrated internal market provides consumers with wider choice and lower prices.
- Making a technological shift: bringing new high-performance, low-carbon technologies to the European markets quicker through collaboration at EU level.

This societal challenge will continue to be supported under the research and innovation programme **Horizon 2020**. It has been designed to back up the energy research and innovation agenda of the SET Plan³.

<http://www.facebook.com/innovation.union>

<http://twitter.com/innovationunion>

³ The Strategic Energy Technology Plan (SET Plan) was created in 2007 to establish an energy technology policy for Europe. It's a strategic plan to accelerate the development and deployment of cost-effective low carbon technologies. It comprises measures relating to planning, implementation, resources and international cooperation in the field of energy technology. COM/2007/0723.

Environmentally-friendly public transportation of the future

The Clean Hydrogen in European Cities (CHIC) Project is the essential next step to full commercialisation of hydrogen powered fuel cell (H2FC) buses. CHIC will reduce the 'time to market' for the technology and support 'market lift off' by:

- Accelerating development of clean public transport systems in 14 new European regions
- Building a critical mass of public support for the benefits of 'green' hydrogen powered transport, leading to increased visibility and political commitment across Europe
- Commercialisation of the project will lead to very significant environmental & economic benefits for Europe and indeed the world.

The CHIC project will receive almost €26 million in funding from the EU's 7th Framework programme.

Project coordinator: Evobus, Germany

Country participants: Belgium, Canada, France, Germany, Italy, Netherlands, Norway, Switzerland, United Kingdom.

For more information:

Project coordinator website: <http://www.evobus.com/>

CHIC project PDF: <http://tinyurl.com/a6ly93d>

Contacts: <http://tinyurl.com/d9kw46b>

Ensuring safe and cost-effective wind power integration

The integration of wind generation into power systems is affected by a number of uncertainties in the prediction of expected power output. A miscalculation regarding weather conditions or a forecasting error can be very costly for infrastructures (e.g. unexpected load on turbines) thereby reducing the value of wind energy for end-users. The aim of the SAFEWIND project is to substantially improve wind power predictability in challenging or extreme situations and at different temporal and spatial scales. This will also contribute to the optimum design and installation of new wind farms as wind predictability is considered an essential factor in this process.

SAFEWIND has received almost €4 million in funding from the EU's 7th Framework programme.

Project coordinator: Association pour la Recherche et le Développement des Méthodes et Processus Industriels, France

Country participants: France, Greece, Germany, Denmark, Spain, Ireland, India and UK

For more information:

Project website: <http://tinyurl.com/nqlaues>

Contacts: <http://tinyurl.com/pcpuo8s>

4. Smart, Green and Integrated Transport



The Importance of Transport

Efficient transport is a fundamental condition for sustainable wealth and prosperity in Europe. Transport drives employment, economic growth and global exports. It provides citizens, societies and economies with essential resources and means of mobility. With an annual turnover of €780 billion and a value added of over €140 billion, the sector makes a major contribution to the EU's GDP: the air transport sector contributes to 2.6% of EU GDP with 3.1 million jobs and the surface transport sector generates 11% of EU GDP employing some 16 million citizens.

However, our transport systems and habits are not sustainable. Our current approach is too dependent on oil, which will become scarcer and is a serious polluter of our planet. Transport is responsible for 25% of all CO₂ emissions in the EU. Additionally, the economic costs of congestion will increase by about 50% by 2050, the accessibility gap between central and peripheral areas will widen and the social costs of accidents and noise pollution will continue to rise.

The 21st century presents us with challenges that require a collective European response. If we do not address these challenges, people's ability to travel – and our economy – could be severely restricted and quality of life eroded. In the transport sector, research is at the core of developing innovative technologies and ways of working that will make the changes required to preserve our mobility at low costs to society.

What is EU Research and Innovation doing to support Transport?

European research aims to develop better European transport systems for the benefit of all citizens i.e. innovative transport systems that are greener, more efficient, smarter and more socially inclusive.

The research funded by the EU ranges from wholly novel approaches to transport, to refining existing technology. It relies on hands-on experience from SMEs as much as on the knowledge of young academics and real life needs of manufacturers.

In 2013, the EU Transport Research Programme will focus on three challenges: eco-innovation, safe and seamless mobility, and competitiveness through innovation. Innovation has been further reinforced by focusing on prototypes, standardisation and social innovation in order to transfer research results to the market.

By the end of 2013, EU research will have financed 620 transport research projects, with more than 8,300 participants, from 69 countries and with an SME participation rate of 17 %.

To unleash the transport sector's full potential for innovation and address its challenges, four main priorities have been identified:

- Making transport more sustainable: resource-efficient transport that respects the environment.
- Making transport and transport systems seamless: better mobility, less congestion, greater safety and security.
- Keeping transport competitive: the European transport industry as a global leader.
- Making transport research responsive: socio-economic research and forward-looking activities for policy-making.

This societal challenge will continue to be supported under the research and innovation programme **Horizon 2020**.

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<http://twitter.com/innovationunion>

Vehicles without a driver in urban transport

Vehicles operating without a driver can supply a good individual or collective transport service in areas of low or dispersed demand complementing the main public transport network.

Heathrow's automated "cybercars" are the centrepiece of the EU-funded research project, CityMobil, which was dedicated to developing urban transportation that reduces pollution and urban congestion.

In January 2014, a new project - CityMobil2 - will select five cities to organise a six to eight months demonstration in each city starting from March 2014. CityMobil2 will receive €9.5 million in funding from the EU's 7th Framework programme

Project coordinator : Universita degli Studi di Roma la Sapienza, Italy

Country participants: Spain, Italy, France, United Kingdom, Germany, Switzerland, Belgium, Finland, Portugal, The Netherlands

For more information:

CityMobil2 website: <http://www.citymobil2.eu/en/>

Contacts: <http://tiny.cc/k36r0w>

CityMobil Heathrow shuttle video: <http://youtu.be/Byk8LcPovOQ>

CityMobil website: <http://www.citymobil-project.eu/>

Contacts: <http://tiny.cc/k36r0w>

Wifi for pilots

Under the leadership of the German Aerospace Centre (DLR), thirty partners have come together to develop a new communication system for aircraft: SANDRA (Seamless Aeronautical Networking through Integration of Data links, Radios and Antennas). It is a secure system that combines all the communication channels on a single device.

A digital device used to transmit high speed communications between the ground and the aircraft satellite has been tested for the first time in flight during four days in June 2013 on a modified A320.

Weather or traffic conditions could be better exchanged between the control tower and the plane.

SANDRA will receive €15.6 million in funding from the EU's 7th Framework programme

Project coordinator : Selex Elsag SPA, Italy

Country participants: Italy, France, United Kingdom, Germany, Ireland, Sweden, The Netherland, Denmark, Hungary, Austria, Russia.

For more information:

Project website: <http://sandra.aero/2013/>

Contacts: <http://tiny.cc/ji7r0w>

5. Climate Action, Environment, Resource Efficiency and Raw Materials



The Importance of the Environment

The era of seemingly plentiful and cheap resources is coming to an end: raw materials, water, air, biodiversity and terrestrial, aquatic and marine ecosystems are all under pressure. The combined impacts of climate change and current production and consumption patterns are undermining our planetary habitat. Based on current trends, the equivalent of more than two planet Earths will be needed by 2050 to support the growing global population. There needs to be a decoupling of economic growth from resource use.

With natural resources becoming scarcer, encouraging a more sustainable use of our limited natural resources is essential both for our well-being and for Europe's economic development. One way of doing this is by minimising waste production and reusing waste as a resource. Europe has proven expertise in handling and treating waste and is at the forefront of innovation in this sector. Capitalising on these strengths would further boost innovative waste prevention and management solutions in order to reduce Europe's dependency on imported raw materials and reinforce its position as a world market leader. The global waste market, from collection to recycling, is estimated at €400 billion per annum and holds significant potential for job creation.

Water is fundamental to human health, food security, sustainable development and the environment. It is also an economic sector of growing importance for Europe with a turnover of some €80 billion a year, making it an invaluable source for growth and jobs. However, water resources are constantly under pressure from climate change, urbanisation, pollution, overexploitation of freshwater resources and increasing competition between various user groups. If we look to the future, without improvements in

efficiency, water demand is projected to overshoot supply by 40% in 20 years' time.

The ability of the economy to adapt and become more resilient to climate change, more resource-efficient, while at the same time remaining competitive, depends on high levels of eco-innovation, both societal and technological in nature. With the global market for eco-innovation worth around €1 trillion per annum and expected to triple by 2030, this represents a major opportunity to boost competitiveness and job creation in European economies.

What is EU Research and Innovation doing to support the Environment?

Helping to build a green economy – a circular economy in sync with the natural environment – is part of the answer.

The Societal Challenge 'Climate action, environment, resource efficiency and raw materials' will focus on investing in innovation for a green economy. This will require great progress in public sector and social innovation. Activities will address gaps in the knowledge base necessary for a thorough understanding of environmental changes, identify the policies, methods and tools that would most effectively tackle the above mentioned challenges; and support innovators and businesses in bringing green solutions to the market. To begin with, waste and water have been selected as particular priorities, on the grounds of their substantial potential for business opportunities and job creation while tackling important resource efficiency challenges.

Concerning waste, activities will focus on the whole production and consumption cycle, from waste prevention, the design of products and processes for recyclability, to re-use and waste disposal. This will allow stakeholders from different sectors to work together in new ways. Citizens will also be involved in developing and testing innovative solutions for waste prevention and management. This priority area will also address specific challenges in the areas of food, agricultural in addition and construction waste.

Activities concerning water will focus on integrated approaches to water management and climate change, bringing innovative water solutions to the market, and harnessing water research and innovation results for the benefit of industry, policy makers and citizens in Europe and worldwide.

Efforts will be made to develop a low-carbon, resource efficient economy with a sustainable supply of raw materials. Activities include supporting businesses in developing and bringing to market eco-innovative solutions. Other actions include: improving our understanding of the complex interactions that take place between ecosystems; better use of Earth observation data systems for the purpose of exchanging information on environmental knowledge with policymakers, business, and society; and focusing on sustainable access to and production of raw materials.

In addition to the priority areas mentioned above, activities relating to 'Climate action, environment, resource efficiency and raw materials' also relate to other challenges such as 'Blue growth: unlocking the potential of the oceans', 'Low carbon energy', 'Energy-efficiency', and 'Disaster-resilience: safeguarding and securing society, including adapting to climate change'.

Since 2007, the EU budget has financed close to 500 environment research projects, with more than 7,000 participants, from 126 countries and with an SME participation rate of 17%.

This societal challenge will continue to be supported under the future research and innovation programme **Horizon 2020**.

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<http://twitter.com/innovationunion>

Helping industry use water sustainably

With climate change and a growing population, the world faces intense pressure on its most precious resource – water. Industry uses an increasing share of that water, and must, therefore, play a central role in ensuring sustainability. The EU-funded project AQUAFIT4USE is developing innovative ways to help the most water-intensive industries reduce their demand on this most precious commodity.

Aquafit4use received €9.6 million in funding from the EU's 7th Framework programme.

Project coordinator: Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek - TNO, Netherlands

Country participants: Belgium, Czech Republic, Denmark, France, Germany, Italy, Netherlands, Poland, Slovenia, Spain, Sweden

For more information:

Project website: <http://tinyurl.com/kpc6zkj>

Contacts: <http://tinyurl.com/mojw3wk>

Intelligent waste sorting

Intelligent and smart actions improving modern-day living are key to a better future and quality of life. This also applies to waste management, and the 'Bottom up selection, collection and management of urban waste' (BURBA) project will provide the means to make this a reality. This approach and technical developments will enable easy identification of the most suitable waste container location and improve its utilisation by users. By including electronics for data transmission, quantity and quality of waste measurement, and a rechargeable power pack, the system will generate information for appropriate waste collection times and management. It will also optimise truck traffic and queuing at waste disposal plants, as well as the allocation of resources.

BURBA has received €2.1 million in funding from the EU's 7th Framework Programme

Project coordinator: D'Appolonia SPA, Italy
Country participants: China, Italy, Poland, Portugal, Spain

For more information:

Project website: <http://www.burbaproject.net/>

Contacts: <http://tinyurl.com/mojw3wk>

6. Inclusive, Innovative and Reflective Societies



The Importance of Inclusion

Reducing inequalities and social exclusion in Europe, where an estimated 80 million people are at risk of poverty and 14 million young people are not in education, employment or training, are crucial challenges for the future of Europe. A rapidly changing world, characterised by the emergence of new economic powers and of new poles of power, also calls constantly for renewed understanding.

EU research based on a strong multidisciplinary approach, including social sciences and humanities, can help address these challenges by exploring new forms of innovation and strengthening the evidence base for policy actions, both at EU and national level. It also promotes coherent and effective cooperation with countries outside the EU and looks at issues such as memories, identities, tolerance and cultural heritage.

What is EU Research and Innovation doing to support Innovative and Reflective Societies?

In 2013, EU research has focused on growth, employment and competitiveness (intangibles, youth, public finances), sustainable development (lifestyles, social entrepreneurship, welfare state), major trends in society (social innovation, education, third sector), Europe in the world (Mediterranean area, transatlantic relationships and India), citizenship (resilience, multilingualism, cultural heritage) and foresight (post-carbon cities).

By the end of 2013, the EU will have financed over 250 socio-economic projects with almost 2,800 participants from 92 countries.

Key future research action will focus on:

- New ideas, strategies and governance structures for overcoming the crisis in Europe (resilient economic and monetary union, EU growth agenda, EU social policies, the future of European integration).
- The young generation in an innovative, inclusive and sustainable Europe (job insecurity, youth mobility, adult education, social political engagement of young people).
- Reflective societies (transmission of European cultural heritage, uses of the past, 3D modelling for accessing EU cultural assets).
- Europe as a global actor (focusing R&I cooperation with third countries, new geopolitical order in the Mediterranean, EU Eastern Partnership, sustainable urbanisation in China...).
- New forms of innovation (in the public sector, ICT government, business model innovation, social innovation community, ICT for learning and inclusion).

This societal challenge will continue to be supported under the future research and innovation programme **Horizon 2020**.

For the very latest information on European Research and Innovation, go to:

<http://www.facebook.com/innovation.union>

<http://twitter.com/innovationunion>

Towards a socio-ecological transition

What kind of growth path should Europe opt for in the face of the financial crisis and the big challenges ahead: globalisation, demographic shifts, climate change and new technologies? What kind of growth path can guarantee Welfare, Wealth and Work for Europe in the long term? These are essential questions about Europe's future that need to be answered today. And these are the questions an ambitious European research project is working on. Its name is its mission: Welfare, Wealth and Work for Europe – WWWforEurope.

Supported by a €8 million contribution from the EU 7th Framework programme, WWWforEUROPE includes 33 partners from 12 Member States.

Project coordinator: WIFO - Österreichisches Institut für Wirtschaftsforschung

Country participants: Austria, Belgium, Czech Republic, France, Germany, Hungary, Italy, Netherlands, Slovakia, Spain, Sweden, UK.

More information:

Project website: <http://www.foreurope.eu/>

Contacts: <http://tinyurl.com/kdu52c6>

Creating and adapting jobs in Europe

NEUJOBS is analysing future possible developments of the European labour market(s) under the main assumption that European societies are now facing or preparing to face four main transitions – societal, socio-ecological, skills and territorial - that will have a major impact on employment, in particular for some groups in the labour force or sectors of the economy.

Supported by a €7.9 million contribution from the EU 7th Framework programme, NEUJOBS includes 29 partners from 14 Member States and US.

Project coordinator: CEPS – Centre for European Policy Studies

Country participants: Austria, Belgium, Czech Republic, Cyprus, Denmark, France, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Slovakia, UK, US.

More information:

Project website: <http://www.neujobs.eu/>

Contacts: <http://tinyurl.com/n5hflhm>

7. Secure and Innovative Societies



The Importance of Security

Ensuring the security of its citizens is one of the primary obligations of any country. Without safety and security as its basis, society cannot thrive. Governments keep citizens secure by fighting crime and terrorism, protecting them against natural or man-made disasters, providing effective cyber-security and protecting borders against illegal trafficking. But while ensuring the security of citizens is an essential task of any administration, it is also a highly sensitive area that needs to incorporate respect for privacy and the safeguarding of fundamental rights. The respect of privacy and individual freedom is thus at the heart of EU security research.

Competitive, EU-based security industries can make a substantial contribution to the quality of life in European societies. European companies are among the world leaders in most security sector segments thanks to their strong technological innovation.

The security industry is one of the sectors with the highest potential for growth and employment in the EU. In 2011, the security sector in the EU employed 180,000 people, with an annual turnover of some €30 billion.

What is EU Research and Innovation doing to support Security?

In 2013, EU research on security focused on “aftermath” crisis management and on “logistics and supply chain security”, addressing issues such as trafficking and contraband. Other research topics include fighting forest fires, rescuing victims of disasters and the use of social media in crisis management.

By the end of 2013, the EU will have financed over 250 security research projects, with more than 1,500 participants, from 45

countries and with an SME participation rate of over 21%.

Key policy actions to enhance the competitiveness of the EU security industry, to stimulate its growth and to promote the creation of jobs include:

- Overcoming market fragmentation through the creation of EU-wide standards, the harmonisation of certification procedures for security technologies as well as better exploitation of synergies between security and defence technologies;
- Reducing the gap from research to market by introducing new funding schemes such as Pre-Commercial Procurement;
- Better integration of societal considerations by thoroughly assessing the impact of security technologies on fundamental rights, and by setting in place procedures to test societal impact during the R&D phase.

This societal challenge will continue to be supported under the future research and innovation programme **Horizon 2020**.

For the very latest information on European Research and Innovation, go to:

<http://www.facebook.com/innovation.union>

<http://twitter.com/innovationunion>

About EU-funded research into cyber security and online privacy

The digital and online economy are central to the EU's economic recovery, however, many citizens and businesses are reluctant to go online due to a lack of trust. Web-based attacks in the EU and around the world increased by 36% during 2011; and in 2010, 15% of EU citizens did not order goods or service for private use online because they were worried about security. The Commission is working to increase confidence in the online economy in particular through research into cyber security and online privacy. €350 million were invested in this field over 2007-2013, through the Framework Programmes (currently FP7) and the Competitiveness and Innovation Programme ICT Policy Support Programme and at least €500 million are likely to be available under **Horizon 2020**.

This research addresses security, trust and privacy coherently from technological, economic, legal, social perspectives, helping to promote innovation and economic growth in the EU, while protecting Europe's society, economy, assets and fundamental rights. The Commission wants to develop trustworthy ICT solutions ensuring a secure and reliable digital environment in Europe.

Keeping fingerprint and facial recognition systems safe from fakes

Finger print, voice and facial recognition identification have moved from sci-fi fantasy and are now in many real life affordable devices, such as smartphones and tablets. The Commissions is investing €4.4 million to support 12 different organisations across seven countries to identify just how well this new software works. Researchers in the TABULA RASA project are looking into the growing phenomenon of “spoofing” i.e. using everyday materials such as make-up, photographs and voice recordings to subvert or directly attack biometric systems.

The project is developing countermeasures that detect signs of “liveness” (e.g. blinking, perspiration) and improve security of biometric systems. TABULA RASA has already transferred five of these countermeasures to companies. Knowledge gained will help improve the design of future biometric sensors, thus opening up the huge potential of biometric technology.

Project coordinator: Idiap Research Institute (Switzerland)
Country participants: United Kingdom, Italy Finland, France, Spain, China and Switzerland

For more information:

Project website: <http://www.tabularasa-euproject.org>

Helping the heroes: New technology for search and rescue operations

Time management is the main challenge for rescuing victims buried under collapsed buildings. Saving time can save lives. The SGL for USaR consortium led by the National Technical University of Athens has developed a portable locator for urban search and rescue operations, integrating a camera, a microphone and field chemical sensors, automatically combining and cross-checking results from multiple devices. In addition, the project also contributed to increasing the quality of already existing sensors used by rescuers.

Supported by a €4.8 million contribution from the EU 7th Framework programme, SGL4USaR includes 21 partners from 11 Member States.

Project coordinator: National Technical University of Athens, Greece

Country participants: Greece, Italy, Germany, United Kingdom, Finland, Belgium, Portugal, Spain, Austria, France

For more information:

Project website: <http://www.sgl-eu.org>

Video: SGL for USaR in Euronews (futuris):

[The chemistry of rescue: http://tinyurl.com/lfszwv7](http://tinyurl.com/lfszwv7)

PDF factsheet: <http://tinyurl.com/btsg7pr>

Contacts: <http://tinyurl.com/cd8v78x>

Localising bombs in urban areas

Terrorist acts committed using Home Made Explosives (HME) pose an increasing threat to our citizens. The use of HME in the 2005 attacks in the London Underground is a frightening example. Our capacity to deal with this threat is challenged by terrorists' ability to easily manufacture explosives from common components.

The LOTUS project seeks to help detect bomb (and drug) factories during the preparation and production phase of a terrorist plot by adapting sensors for detection of selected precursors, and integrating these sensors into a networked system. By using existing global infrastructures for positioning (GPS) and networking (GSM) the LOTUS system can be used more or less anywhere in the world with small costs for supporting installations and personnel.

The overall objective of the LOTUS project is to develop a new anti-terrorism tool for law enforcement agencies, in the form of an integrated surveillance system for continuous chemical background monitoring with fixed site and/or mobile detectors to identify “chemical hotspots”.

The LOTUS consortium consists of three research institutes (FOI, TNO, AIT), two industrial groups (SAAB, Bruker), three SMEs (Portendo, Ramem, Bruhn NewTech), the University of Barcelona, and a group of End Users.

The project Lotus has received a €3.1 million contribution from the EU 7th Framework programme.

Project coordinator: Totalforsvarets Forskningsinstitut, Sweden
Country participants: Greece, Netherlands, Spain, Denmark, Germany

For more information:

Project website: <http://tinyurl.com/lhcw52v>

4. Useful information sources

DG Research & Innovation: <http://ec.europa.eu/research/index.cfm?pg=home&lg=en>

FP7: http://ec.europa.eu/research/fp7/index_en.cfm

FP7 in a nutshell: <http://tinyurl.com/cpjvrq>

Innovation Union: http://ec.europa.eu/research/innovation-union/index_en.cfm

Horizon 2020: http://ec.europa.eu/research/horizon2020/index_en.cfm