
European Commission
Investing in European success
Developing a Bioeconomy using resources from land and sea
Research and Innovation

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E-mail: RTD-PUBLICATIONS@ec.europa.eu

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2012 Directorate-General for Research and Innovation

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INTRODUCTION

This booklet presents a selection of projects that show Europe's investment in Research and Innovation as the cornerstone of the bioeconomy. These concrete examples show how bioeconomy research produces good ideas and concrete products that make a positive change to our daily lives. They also demonstrate that investment in research and technology make our businesses more competitive and create new opportunities for the future.

With the world population approaching 9 billion by 2050 and natural resources finite, Europe needs renewable biological resources for secure and healthy food and feed, as well as for materials, energy, and other products. In order to reduce the heavy dependency of its economy on fossil resources and mitigating climate change, Europe needs to move towards a post-petroleum society.

The Strategy "Innovating for Sustainable Growth: a Bioeconomy for Europe" adopted by the European Commission on 13 February 2012 offers a unique approach to address these challenges in a comprehensive manner. It will contribute to this transition by promoting research and innovation into the sustainable production and exploitation of renewable raw materials as alternative energy and carbon sources. It will pave the way to a more innovative and low carbon society that reconciles food security with the sustainable use of renewable biological resources for industrial purposes while creating new job opportunities.

The Bioeconomy Strategy is based on three complementary pillars. The first pillar is focused on increasing investment into research, innovation and skills. Under the European Framework Programme for Research and Innovation "Horizon 2020" (2014-2020), € 4.7 billion of funding have been proposed for bioeconomy research and innovation under the societal challenge "Food security, sustainable agriculture, marine and maritime research, and the bioeconomy" and for biotechnology as an enabling technology.

Each euro invested in EU-funded bioeconomy research and innovation is estimated to trigger €10 of value added in bioeconomy sectors by 2025.

The second pillar of the Strategy aims to improve synergies and coherence between the priorities of the European research and innovation policy and other policies relevant to the bioeconomy. It will provide different platforms to enhance interactions between researchers, policy makers, industries and society and support similar initiatives in EU Member States and Regions. The Strategy will also further develop international cooperation in the area of bioeconomy.

In its third pillar, the Strategy provides support to new markets and the expansion of existing ones, for example by promoting the development of standards, sustainability assessments and labels for bio-based products to facilitate their uptake in consumer markets and by green procurement. It also promotes the establishment of networks of integrated and diversified biorefineries, demonstration and pilot plants across Europe.

Finally, the Strategy promotes the development of science-based approaches to better inform consumers about product properties (e.g. environment sustainability) and to promote a healthy and sustainable lifestyle.

The success of the Strategy, however, will very much depend on the engagement of Member States, Regions, stakeholders in the research and innovation community and citizens.

http://ec.europa.eu/research/bioeconomy/

IMAQUANIM

Understanding fish immune systems to develop efficient fish vaccines

Participants

*Norway, **Denmark** (Coordinator), Czech Republic, Germany, France, Italy, Spain, United Kingdom*

www.imaquanim.dfvf.dk

FP6	Proj. N°	7103	Total costs:	€ 10 500 000	EU contribution:	€ 8 000 000	Duration:	from: Apr. 2005 to: Sept. 2010

With the world's fisheries under severe pressure from over-exploitation, and in many cases in serious decline, society is growing increasingly dependent on aquaculture to meet its dietary needs for seafood.

Already accounting for more than a third of the total seafood production, at 55 million tonnes in 2009 (FAO, 2010), aquaculture production is increasing rapidly. Within just a few years, according to the UN's Food and Agriculture Organisation, it will dominate the world fish market.

But this vital source of food is under constant threat from diseases caused by bacteria, viruses and parasites. Diseases can be rapidly transmitted through water, particularly where fish are raised in high population densities, and the effects can be disastrous. In the 1980s, bacterial disease devastated the Norwegian salmon farming industry, with a total collapse only averted by the use of large amounts of antibiotics.

Antibiotics, drugs and chemical disinfectants are still used in both aquaculture and land livestock production to prevent and contain disease. But these can have harmful effects both on the environment and on human health – most notably in making human diseases more resistant to antibiotics.

An approach focusing on prevention rather than cure is clearly the key to a more sustainable future.

If vaccines could be developed to protect the major farmed fish species, it would mark a major step forward – not only for fish health but also for the environment, for human health and for the aquaculture industry itself.

In comparison with humans, however, and despite some advances in recent decades, the immune systems of fish and the vaccines that might be effective with them are still poorly understood. It was to fill this crucial knowledge gap that in 2005, the European Commission provided more than € 8 million of funding for the IMAQUANIM project.

The five and half year project brought together the expertise of 17 universities and governmental research institutes from around Europe, along with five small and medium sized enterprises (SMEs). The five SMEs were all specialists in the development of products or technologies for use in aquaculture health.

The wide variety of partners enabled the project to study several species, including Atlantic salmon, rainbow trout, sea bream, sea bass, carp and mussels, and to draw on a multidisciplinary skill-set ranging from immunology to genetics, genomics and molecular biology. One of the breakthrough outputs from the project was the production of the first complete information-set on active genes in mussels.

By significantly increasing our understanding of the immune systems of both fish and shellfish, the extensive data produced by the IMAQUANIM project were vital in providing a strong basis for the future, to fight both known and new diseases in aquacultured species. Tools and techniques made possible by the project's work, including gene arrays and immune-response tests, will now be used to develop not only vaccines but also feed additives to stimulate fish immune systems and provide them with the protection they so urgently need. Although it is not possible to develop vaccines for molluscs, Imaquanim will ultimately also contribute in developing efficient prevention tools (i.e. antimicrobial peptides) and strategies (i.e. better site selection, selection of disease resistant strains etc) for farmed mollusc species.

There is still much work to be done, but at a time when fish stocks are under unprecedented strain, the work of IMAQUANIM represents a huge step towards developing efficient prevention tools and strategies against major pathogens and diseases, and towards removing a major threat hanging over the future of every business in the aquaculture industry.

PHARMA-PLANTA

Harnessing plant biotechnology to revolutionise pharmaceutical production

Participants

*The Netherlands, **Germany** (Coordinator), France, Italy, Belgium, Spain, Sweden, United Kingdom, Austria, Greece, Switzerland, South Africa*

www.pharma-planta.net									
FP6	Proj. N°	503565	Total costs:	€ 17 600 000	EU contribution:	€ 12 000 000	Duration:	from:	Feb. 2004
								to:	Oct. 2011

In June 2011, medical regulators gave the go-ahead for trials in humans of a potential new anti-HIV drug. The drug was produced in genetically modified tobacco leaves.

It was the first ever clinical trial of a drug of this type that had been derived from GM plants.

The hope is that the drug will prove effective in preventing HIV infection. But the real significance of the regulatory green light, given by the UK's licensing body, the Medicines and Healthcare products Regulatory Agency (MHRA), went further than that.

It confirmed, for the first time, that molecules known as monoclonal antibodies – the key component of the drug, and of many other highly effective modern pharmaceuticals - could be produced from plants in a form that met the extremely stringent standards required for use in the treatment of humans.

As well as bringing hope to the fight against HIV/AIDS, the decision opened the way for trials of other plant-derived medicines to treat a range of diseases.

It was, potentially, an important step towards the transformation of modern drug manufacturing, offering the developing world access to key drugs which have previously been prohibitively costly.

The move to Phase 1 clinical trials was the crowning achievement of PHARMA-PLANTA, a seven-and-a-half year EU-funded project set up in 2004. With € 12 million of funding provided under the EU's 6th Framework Programme of research and development, the PHARMA-PLANTA consortium comprised more than 30 academic and industrial partners from across Europe and South Africa. The consortium's goal was clearly stated: to develop a manufacturing process for recombinant protein drug products derived from GM plants and to take one such product through all the development stages, including clinical trial.

The approval from the MHRA was described by the project's scientific co-ordinator, Professor Julian Ma of St. George's, University of London, as "a red letter day". It was, he said, "an acknowledgement that monoclonal antibodies can be made in plants to the same quality as those made using existing conventional production systems. That is something many people did not believe could be achieved."

The conventional production systems referred to by Professor Ma use sophisticated stainless steel fermentation vats containing bacteria or mammalian cells. The process of deriving antibodies from these cells is high-tech - and highly expensive.

By contrast, the antibodies produced by PHARMA-PLANTA were derived from tobacco plants grown in greenhouses in Germany, harvested after 45 days and shredded. According to Professor Rainer Fischer, Director of the institute where the GM tobacco was grown, this much simpler, more low-tech option is between 10 and 100 times cheaper.

Just as importantly, the simplicity of the process means it could easily be transferred to developing countries, allowing production of drugs "in the region, for the region."

Discovered by one of the four private commercial partners in the project, Austrian biotech company Polymun, the new antibody successfully completed its Phase 1 trial, ascertaining its safety, at the end of 2011. It is now set to move into the next phase of testing, to establish its medical effectiveness.

Meanwhile, other diseases for which it is envisaged that GM plants could provide new drugs include cancer, rheumatoid arthritis and others which, in the words of Professor Ma, are currently "horribly expensive" to treat.

As Professor Fischer explains, the success of PHARMA-PLANTA "is a springboard for European plant biotechnology and will enable many important medical products to be realised".

MEM-S

Unlocking ancient secrets of the deep to extend the boundaries of modern biotech

Participants

*The Netherlands, **Germany** (Coordinator), France, Austria*

http://ec.europa.eu/research/bioeconomy/biotechnology/projects/mem-s_en.htm									
FP7	Proj. N°	244967	Total costs:	€ 3 650 000	EU contribution:	€ 2 820 000	Duration:	from:	Jan. 2010
								to:	Dec. 2012

In today's fast-moving world, many forms of human activity require ever more precise and sophisticated technology – either to perform a particular, specialised function, or to provide reliable means of micro-screening and analysis.

The rapidly evolving spheres of biotechnology and nanotechnology provide many of the required solutions. Frequently the two are combined - in the form of nanobiotechnology.

One area where demand for this technology is strong is that of membranes for microsieves – nanoscale filtration methods, which play a key role in the analytical systems, used in areas such as food processing, drug discovery or medical diagnostics. anoporous membranes and microsieves can be used to eliminate, or to detect the presence of microbes in drinking water, such as *Legionella* or *E.coli*. In the biomedical field, they can be used to detect tiny differences or abnormalities among cells.

They are even used as a way of ascertaining beer purity.

An unlikely but extremely fertile source of new discoveries and materials to assist with this technology is the seabed - in the cold zones where no light penetrates.

Life originated in the sea. The oldest animals still in existence are the sea sponges. And, incredibly, it is these animals, the most ancient form of life on earth, that are now making a vital contribution to the world's most modern science. This phenomenon is at the heart of Mem-S, a research project funded under the EU's 7th Framework Programme with the aim of using cutting-edge molecular biology techniques to design and fabricate nanoporous membranes and microsieves with new and innovative capabilities for use in industrial applications.

Begun in 2010, the three-year project, leaded by the University Medical Centre of the University of Mainz, involves three research-based SMEs and four universities and research institutes from Germany, the Netherlands, Austria and France.

Sea sponges contain a number of enzymes and proteins. One of these is silicatein, the only known enzyme in existence with the capability of synthesising an inorganic polymer, silica, from an inorganic precursor molecule.

This silica (or biosilica) is what forms the sponge's skeleton. However, its key property combinations, including light transmission and extreme stability – unlike technical glass, which breaks easily – make it valuable for a range of advanced technological applications.

Just as importantly, the silicatein needed to form the silica can be produced in a sustainable way by a process of genetic engineering, inserting the sponge gene into bacteria.

In the Mem-S project, this breakthrough technology is linked with another cutting-edge development – so-called 'S-layer' (crystalline bacterial cell surface layer) technology. The beauty of S-layer proteins is that they assemble themselves in highly ordered structures of defined pore size and shape – a feature that makes them ideal for use as nanoporous membranes in microsieves.

By binding to the silica, enzymatically produced by the silicatein, the membrane gains reinforcement and support, while the silica can also be utilised to encase any specific biomolecules needed for the individual filtration or sensory function required.

The new technique will be exploited by the three SME's involved in the project – the German NanotecMARIN GmbH, and the Netherlands' Lionix BV and Aquamarijn Micro Filtration BV, in sensors in drinking water systems, in industrial nanosieves and in microfluidics-based sample processing and micro-array development.

The astounding properties of biosilica, meanwhile, make it a promising material for use in other areas such as microelectronics and medical implant materials.

From sponge skeleton to microchips. It is an incredible journey through space and time. From the prehistoric depths of the sea, a brave new world is indeed arising.

NUTRIMENTHE

Science-based facts reveals how early diet impacts mental development

Participants

*Germany, Italy, Belgium, The Netherlands, **Spain** (Coordinator), United Kingdom, Hungary, Poland, United States*

www.nutrimenthe.eu									
FP7	Proj. N°	212652	Total costs:	€ 8 200 000	EU contribution:	€ 5 900 000	Duration:	from:	Mar. 2008
								to:	Feb. 2013

Fish, especially oily fish, has long been seen as good 'brain food'.

Recent studies have taken that one stage further – indicating that consuming fish while still in the womb is even better.

At the age of eight, children born to mothers who ate regularly fish during pregnancy have been shown to score better on verbal intelligence, fine motor skills, and social skills like giving, helping and sharing. Despite the potential disadvantages from increased intakes of contaminants through fish intake, it has been shown that the beneficial effects of higher omega-3 fatty acids supply from sea fish on child development outweigh those disadvantages. The European Commission supported expert consensus recommendations, including the advice that pregnant and lactating women should aim to achieve the omega-3 requirements with two portions of fish per week, with no risk for their offspring.

What is not yet known is exactly how this linkage occurs. Why should eating fish in pregnancy lead to children who do so much better? Nor do the questions stop there. This is just one among many - all just as important for our children's mental development. A growing body of opinion now sees the environment and nutrition we experience in our first 1,000 days as crucial determinants of both mental and physical health for the rest of our lives.

And of course, all parents want to do the best for their children. Mothers naturally want to know what they should eat during pregnancy. What should they avoid? Should they take supplements?

Instinctively, many people feel dietary intake must play a central role in how their children develop, not just physically but mentally. But clear scientific evidence has so far been limited.

It was to address this issue that the NUTRIMENTHE project was established in 2008. With funding provided under the Food, Fisheries, Agriculture and Biotechnology programme of the EU's 7th Framework Programme, NUTRIMENTHE brought together scientists from 19 organisations from 8 European countries plus the USA, and it is coordinated by Prof. Cristina Campoy at the University of Granada (Spain).

The aim: to embark on a five year programme to study in more detail than ever before exactly how and why diet can impact on the mental development and performance of children.

As well as providing an invaluable guide for parents, improving our understanding of how mental performance, cognitive development and behaviour can be affected by early diet will have important implications for public health policy development - as well as for the food industry and its regulation. As well as research institutes, the project's participants included private enterprises – including the research and development department of the global food manufacturer, Unilever.

Looking at the benefits of eating fish during pregnancy, the 'hot candidates' are omega-3 and omega-6 fatty acids as the key nutrients, especially since these are key building blocks in the cell membranes of the brain. But no-one yet knows for sure. The study is examining whether this really is the case and, if so, exactly how the benefits are transmitted from mother to child.

A further area the study is hoping to understand is how far the genes of the mother determine the process, and how much influence is exerted by the genes of the child. As well as the impact of omega-3 and omega-6, the wide-ranging NUTRIMENTHE project is also investigating the role of other specific nutrients in children's mental performance, including B-vitamins, iodine, iron, zinc and protein. The project will even investigate the economic impacts associated with the various ways in which these dietary factors are shown to affect mental performance.

Due to end in 2013, the groundbreaking NUTRIMENTHE project aims to result in the establishment, for the first time, of reliable, science-based dietary recommendations for a range of different nutrients.

By improving both public knowledge and public policy, NUTRIMENTHE promises to play a crucial role in ensuring the best possible outcomes for future generations.

ANAMMOX

Biotechnology at the service of wastewater treatment

Participants

The Netherlands (Beneficiary),

http://www.microbiology.science.ru.nl/people/mjetten/									
FP7	Proj. N°	232937	Total costs:	€ 2 500 000	EU contribution:	€ 2 500 000	Duration:	from:	Jan. 2008
								to:	Dec. 2013

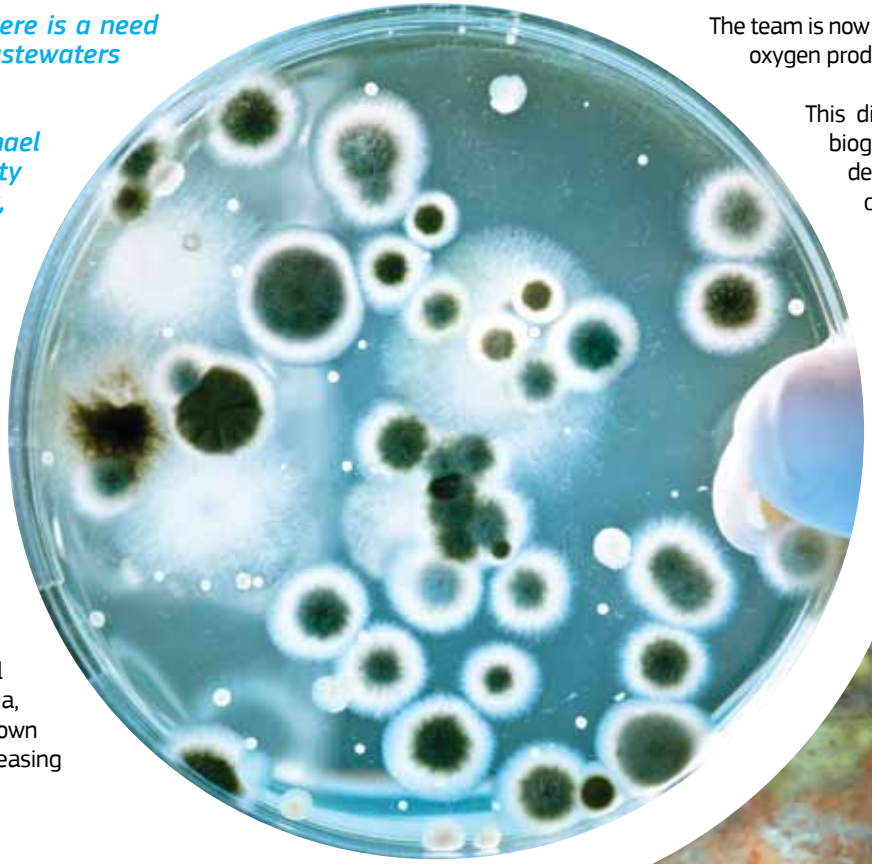
As water resources are under severe pressure, there is a need to develop smart sustainable systems to clean wastewaters for instance.

The project conducted by ERC grantee Michael Jetten is about studying the diversity and activity of micro-organisms in their natural environment, their mutual interactions and their survival and adaptation strategies.

His research focuses on the microbial ecology of freshwater systems and in particular on the microbial processes at the very interface between the sediment and the water column.

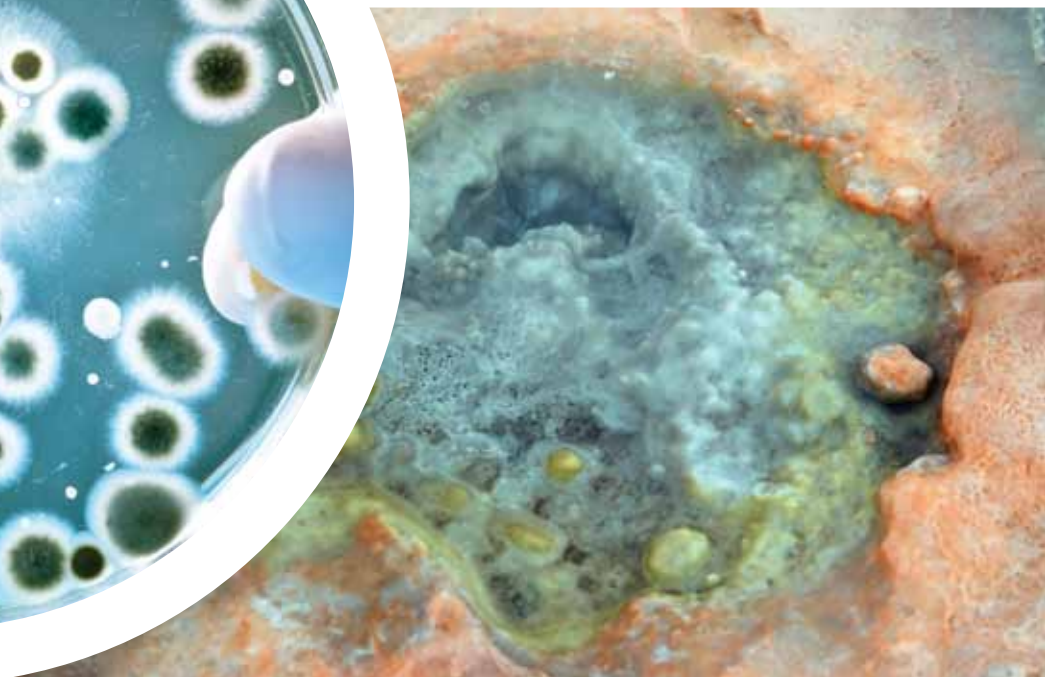
Researchers have isolated the microbes responsible for the anammox reaction (i.e. the removal of ammonium in environments lacking oxygen like e.g. wastewater) in freshwater sediments in Dutch drainage ditches and studied their complete genome.

The anammox are unique microbes with many unusual properties. Understanding their metabolism and ecological importance is essential. By using those lab-grown bacteria, the research's team investigated how the bacteria broke down nitrites, using oxygen to consume the ammonium and releasing nitrogen that is harmless for the environment.



The team is now trying to understand which enzyme is produced that enables oxygen production.

This discovery may not only improve our understanding of the biogeochemical nitrogen cycle but also pave the way for developing cheaper technology with lower CO2 emissions to clean wastewater plants for instance.



AQUAMAX

Creating a "vegetarian" diet for fish to aid sustainable aquaculture

Participants

*Norway, Germany, **Switzerland** (Coordinator), France, Italy, Belgium, Spain, Sweden, United Kingdom, Greece, Estonia, Hungary, India, China*

www.aquamaxip.eu									
FP6	Proj. N°	16249	Total costs:	€ 16 000 000	EU contribution:	€ 10 500 000	Duration:	from:	Mar. 2006
								to:	Ago. 2010

Fish are a vital component of the human diet. As well as providing a crucial source of protein, the health benefits of eating fish, especially oily fish, are well documented. The omega-3 fatty acids they contain can reduce the risk of cardiovascular disease, and they provide building blocks for the human eye and nervous system.

However, this seeming "wonder food" is under threat. Fish stocks are overexploited and collapsing worldwide.

Aquaculture – farmed fish – is contributing to meet world demand, but this too faces serious constraints. Fish meal and fish oil are major ingredients in the feeds used in aquaculture. At the same time, they constitute major limiting factors for the promising growth of the sector since there is a concern as to whether there is sufficient fishmeal and fish oil to meet the increasing demand of aquaculture and, therefore, whether this growth will be limited by their availability.

To compound the problem, fish meal and fish oil can be sources of contaminants such as organic pollutants (PCB's), dioxins and methylmercury.

It was to address this problem that project AQUAMAX was established in 2006, funded by the EU within the 6th Framework Programme.

Underlining the global importance of the topic, the project brought together 32 partners not only from within Europe but also from China and India.

The task: to come up with new, efficient, safe and sustainable feeds for aquaculture that would reduce the need for fish oil and fish meal and minimise the threat from pollutants, without impairing the quality and health of the farmed fish. In addition, it was important not to compromise the organoleptic and nutritional benefits or safety of the final product when consumed as part of the human diet. The project has taken a whole chain approach, including feeds and fish production and safety, potential health benefits and consumers perception of farmed fish.

The four-year project involved several private companies from the aquaculture sector, such as Selonda Aquaculture SA, Viviers de France and the Federation of European Aquaculture Producers, working alongside a number of universities and public research institutes.

As a result of this unprecedented international and interdisciplinary collaboration, the AQUAMAX participants achieved a major breakthrough, developing new aquaculture feeds in which both fish oil and fish meal were largely replaced by alternative ingredients, mainly derived from terrestrial plants.

Tested with a range of fish including salmon, rainbow trout, sea bream and carp, the new AQUAMAX diets were shown to have no compromising impact on fish health and development, while the fish showed only trace levels of pollutants, well below EU maximum permitted levels. The project has also developed tools for screening toxic compounds and improved our understanding of the action of key toxicants that can be found in fish (farmed or wild).

Tests on the health benefits and safety to humans of the new fish also showed extremely positive results, as did perception tests designed to assess the acceptability of "AQUAMAX fish" to consumers. One of the highlights of the project was the pioneering long term study on pregnant women (in Europe and China) consuming fish fed with Aquamax feeds that has released promising preliminary results on both mothers and their "Aquamax" babies. Further testing and validation will of course be required. By confirming the feasibility of innovative "vegetarian" regimes for carnivorous fish, the AQUAMAX project has taken a major step towards providing the European feed manufactures with the flexibility required to develop safe aquaculture feeds tailored to the needs of the fish and the consumer, while coping efficiently with the volatility of feedstuffs in the global markets.

ANIMPOL

Sustainable plastics: Courtesy of the slaughterhouse

Participants

*Germany, Italy, United Kingdom, **Austria** (Coordinator), Croatia, Poland, Slovenia*

www.animpol.tugraz.at/englisch/eng_kontakt.htm

FP7	Proj. N°	245084	Total costs:	€ 3 750 000	EU contribution:	€ 2 900 000	Duration:	from:	Jan. 2010
								to:	Dec. 2012

The search for alternative products to wean the world away from its dependence on petro-chemicals is an intensive and ongoing one, which takes many forms. Researchers have explored many different avenues. However, one place the search has led them to is perhaps more unexpected than many others: the slaughterhouse.

It may be a startling development, but waste from abattoirs could be an important source of the plastics we all use in the future.

Animals naturally contain substances known as lipids – long, carbon-rich polymer molecules that make an ideal building block for bioplastics. It follows that the parts of animals, which do not get used for food or other products, are therefore a potentially valuable – but so far untapped - resource.

An EU-funded project, ANIMPOL, established at the beginning of 2010, has brought together scientists from research institutes and industry from seven European countries with the objective of finding ways to make the best use of these important biopolymer molecules. In the past, they have simply been incinerated.

Assisted by € 3 million of funding under the EU's 7th Framework Programme, the three-year project is aimed at maximising the potential to use this animal waste and its by-products in order to produce both materials for bioplastics, known as PHAs, and biodiesel.

Currently the amount of animal lipids being discarded annually from slaughterhouses is in the region of 500,000 tons. Together with the estimated 300,000 tons of waste materials from the biodiesel production, these materials could be utilised for the biotechnological production of bioplastics.

In addition, the project is investigating ways of producing these plastics at an economically viable cost, and then devising products and establishing markets where they can be distributed.

It is estimated that as much as half a million tons of these animal lipids are discarded every year by the animal slaughtering industry.

As ANIMPOL's project co-ordinator, Dr Martin Koller of the Graz University of Technology in Austria puts it: "Nature creates polymers like these lipids, as well as proteins, free of charge – why should we incinerate them?"

In the process being developed by ANIMPOL, fatty material is extracted from the animal waste, analysed and converted into fatty acid compounds. In turn, using a method pioneered by the project team, these are separated into saturated and unsaturated fatty acids. The unsaturated fraction can be used to produce high quality biodiesel, while the saturated fraction can be biotechnologically converted into PHAs.

The production of biodiesel in this way is similar to existing systems using recovered waste fat and oils. Therefore, the ultimate key for ANIMPOL will be its success in providing added value through PHA production. In other words, ANIMPOL polymers will - quite rightly - have to prove their worth in economic value terms against competing forms of polymer production such as composting or anaerobic digestion.

Success is not guaranteed, therefore. Nevertheless, ANIMPOL scientists are confident that their project – which will also feature life-cycle analyses, feasibility studies and market research - will result in a variety of novel, environmentally friendly, biodegradable plastics that will meet clear industrial needs in a realistic, value-adding manner.

Last but not least, ANIMPOL would also, if successful, solve local waste problems affecting locations around the entire EU.

At a time when the world seems increasingly addicted to plastic, ANIMPOL offers clear evidence that, with imagination and ingenuity, mankind can make use of a wide range of potential sources of biomass to generate sustainable alternatives.

Never has it seemed more appropriate to state that necessity is indeed 'the mother of invention'.

EuroBioRef

How a radical re-design is strengthening economic viability in the bioeconomy

Participants

France *(Coordinator), Portugal, Germany, Italy, Belgium, United Kingdom, Greece, Poland, Bulgaria, Sweden, Norway, Denmark, Madagascar*

www.eurobioref.org									
FP7	Proj. N°	241718	Total costs:	€ 37 400 000	EU contribution:	€ 23 000 000	Duration:	from:	Mar 2010
								to:	Feb. 2014

For most people, the bioeconomy is the way of the future. A shift towards an economy based on renewable resources not on fossil fuels is no longer just an option, it's a necessity.

The word "bioeconomy" has only existed since the late 1990s. And while the biotech story is undoubtedly an exciting one, it is equally important to find an economically viable way of implementing its techniques and getting the resulting products to their end-users.

If the target is to achieve a genuinely functioning bioeconomy – placing just as much emphasis on the 'economy' side of the concept as the 'bio' part – significant progress is still needed.

At the very heart of this issue lies the bio-refinery – the plant where raw materials (generally biomass) are treated, processed and turned into their final product.

Existing biorefineries are limited in the types of biomass feedstock they process, the technologies they apply and the final products they focus on. This has the effect of substantially limiting the added value that can potentially be achieved.

EuroBioRef is an EU-funded project set up to address this problem by identifying improvements in bio-refinery design and operation.

These improvements could play a pivotal role not only in enabling a truly viable bioeconomy, but also in giving Europe an important competitive advantage in this vital new area.

With € 23 million of funding allocated under the EU's 7th Framework Programme, EuroBioRef brings together four different FP7 research themes: Food, Agriculture and Fisheries, Biotechnology; Nanosciences, nanotechnologies, materials and new production technologies; Energy; and Environment (including climate change).

Established in 2010 and due to continue until 2014, the project is focused on developing a highly integrated, multipurpose refinery. In contrast with previous designs, this one would be capable of handling multiple feedstock's, processing them in multiple ways (chemical, biochemical, thermochemical), and producing multiple products, from aviation fuels to chemicals, polymers and other materials.

The project is also aiming to produce a design which is modular and flexible, allowing it to be installed in various locations around Europe as either large- or small-scale units as local conditions require.

The highly diversified nature of the new biorefinery design is vividly demonstrated by the range of project participants. The 28 partners are drawn from research institutions and commercial enterprises across the entire biomass value chain.

They include biomass producers, advanced biomass pre-treatment specialists, catalytic and enzymatic reactions developers, and final chemical and biochemical producers and end-users.

In addition to the production of a broader range of higher value-added products, it is expected that the greatly enhanced efficiency of the new design will yield significant benefits. These will include a 30% improvement in cost-efficiency, a 30% reduction in energy use, and zero waste production.

The work of EuroBioRef is still far from complete, but the potential prize is clear. The project will provide an efficient bridge between the agriculture and chemical industries by integrating the entire biomass chain in a single concept, adaptable for use in a range of locations. It is an advance which will do much to help provide a viable basis for the bio-economy as a whole.

It will also put Europe at the forefront of what is sure to be one of the most dynamic and important areas of economic and scientific activity of the future.

EU-FRESHBAKE

Freshly baked bread: the healthier and greener way

Participants

France *(Coordinator), Croatia, Spain, Germany, Russia, Belgium, Poland, Italy*

http://eu-freshbake.eu/eufreshbake/									
FP6	Proj. N°	36302	Total costs:	€ 3 400 000	EU contribution:	€ 2 000 000	Duration:	from:	Oct. 2006
								to:	Nov 2009

Bread is thought to have been part of the human diet for around 30,000 years. In mediaeval Europe, breads were named after the class of people who ate them – giving rise to the likes of "squires loaves", knights loaves", "common loaves," or even a "pope's loaf".

Today, Europeans consume 25 million tonnes of bread - and far from being tied by our social class or our occupation to just one type, we are becoming increasingly demanding, both in terms of the variety and the quality of bread we expect.

Total bread consumption in Europe is relatively steady, growing at just 1% a year. But bread produced by one particular technology is growing very rapidly. So-called 'bake-off technology' (BOT) bread is growing at about 10% a year.

Bake-off technology involves leaving the bread in a semi-finished state, such as frozen dough or part-baked, to be finished off either at the point of sale – the supermarket or petrol station, for example - or at home. The advantages are clear: fresh bread can be baked on demand, providing a greatly enhanced experience for the consumer and resulting in less waste.

Unfortunately, the problems are equally clear. First, bake-off technology is more energy-intensive than conventional baking, requiring as much as four times more energy. Second, it is almost entirely focused on the production of bread types which have limited nutritional value, such as white flour plain rolls and baguettes. Healthier breads are much more difficult to make using BOT.

The difficulty for the bread industry is that consumers are now showing clear signs of demanding precisely these healthier bread varieties.

The EU-FRESHBAKE research project was established towards the end of 2006 to address these twin issues, thereby providing an important boost to the European bakery industry as well as delivering significant benefits for the consumer.

Backed by € 2 million of funding under the EU's 6th Framework Programme, the 38-month project brought together 12 partners from eight different countries, including Russia. They included seven research organisations and five industrial partners – three baking companies, one bakery equipment company and one ingredients supplier.

One important success for the consortium was the development of innovative baking equipment, resulting in reduced energy consumption of between 30% and 50%. Improved refrigeration equipment was also developed, cutting energy requirements by 5% to 15%. When used in tandem with carefully managed freezing and storage conditions, this energy saving rose as high as 50%.

The project also investigated ways in which bake-off technology could be used to enhance the nutritional value of bread. Three types of bread were studied – conventional, gluten-free and organic. Aspects the scientists examined included managing the glycaemic index of bread – a higher glycaemic index indicating greater risk of Type 2 diabetes – together with ways in which the type of bread and its method of production could affect the way in which nutrients in the bread are absorbed by the body.

The full findings of the research were collated in a comprehensive Guide of Good Practice, published to provide the bakery industry with detailed recommendations to optimise both nutritional quality and energy conservation through all stages of the BOT process.

As a result of the EU-FRESHBAKE project, producers and consumers have been brought an important step closer together. The industry is better placed to meet ever more sophisticated customer demands, while at the same time reducing the environmental impact required to do so.

Even after 30,000 years, the story of bread continues to develop.

FORBIOPLAST

Drawing on forest resources to aid sustainable manufacturing

Participants

*Germany, **Italy** (Coordinator), Belgium, Spain, Greece, Latvia, Romania, Hungary, Norway*

www.forbioplast.eu									
FP7	Proj. N°	212239	Total costs:	€ 5 900 000	EU contribution:	€ 4 317 000	Duration:	from:	Jul. 2008
								to:	Jun 2012

The timber industry currently wastes huge amounts of precious wood by-products like chips, shavings and sawdust that could otherwise be put to use. European researchers, with the support of EU funding, are finding new ways to ensure every little bit counts.

In order to alleviate the depletion of the world's natural resources, it is crucial to find ways of making better use of wood, without chopping down more trees. FORBIOPLAST (Forest Resource Sustainability through Bio-Based-Composite Development), a research consortium receiving 4,317,000€ in EU funding over four years, may offer the solution.

They are examining how to use wood by-products as raw materials to make composite foams.

There are many potential applications for wood composites. Coordinated by the University of Pisa, the 16 FORBIOPLAST partners are developing innovative chemical and biological processes to help change the way wood fibres interact with polymers.

Carmaker FIAT, one of the FORBIOPLAST partners, is looking at using wood fibres as natural fillers to replace synthetic and glass fibres in vehicle parts like seats, dashboards, and door panels.

Europe's packaging sector, already under pressure to reduce its use of plastics, is looking for substitutes that are strong, flexible and adaptable.

Here, the research uses wood fibres as components in biodegradable composite materials. FORBIOPLAST is working on replacements for cardboard or plastic boxes that carry items as varied as cosmetics, detergents, fish, or eggs. The project is also looking at applications for the farming sector, like biodegradable plant pots, tomato yarn and fertilisers.

There are multiple challenges for the researchers. For example, while the auto-motive industry demands solid, durable products, the packaging sector wants non-toxic, biodegradable materials that can be composted or directly in soil degradation. The experiments involve different source material, with some of the applications using olive oil waste water. FORBIOPLAST aims to examine these challenges and turn its research into eco-friendly commercial applications, ensuring that we can make the most of our forestry resources, without depleting them.

It may be years before any wood composite shampoo bottles or car seats are widely available, but researchers are working to bring them to market. Wood remains a prized material, for its strength, versatility and beauty.

But market prospects for wood composites have spurred European researchers into finding new ways to salvage what would otherwise be considered wood waste. And there are wood by-products readily available.

The global timber industry annually discards hundreds of millions of tonnes of bark, chips, sawdust, and black liquor from the making of wood pulp. Some of these have already found their way into engineered wood products bonded together with resins, resulting in a booming market.

The more efficient and sustainable exploitation of renewable natural resources such as forestry residues and waste, will allow the European economy to reduce its strong dependency on fossil resources for the production of value-added products. Furthermore, new markets for bio-based products have the potential to generate new jobs and economic growth.

PEN

Uniting the world to tackle the scourge of E.coli

Participants

*The Netherlands, Germany, France, Australia, **Ireland** (Coordinator), Italy, Belgium, Spain, United Kingdom, Norway, Poland, Greece, Denmark, Israel, Chile, United States*

www.pen-project.eu									
FP6	*Proj. N°*	*36256*	*Total costs:*	*€ 9 600 000*	*EU contribution:*	*€ 8 100 000*	*Duration:*	*from:*	*Feb. 2007*
								to:	*Jan 2010*

E.coli is a term unpleasantly familiar to people all around the world. Outbreaks of infection make dramatic headlines whenever they occur – and with good reason. While some E.coli strains are harmless, the ones we get to hear about are virulent, debilitating and often fatal.

One of the biggest E.coli outbreaks occurred in Japan in 1996, when 6,000 people became ill and 17 died after eating bean sprouts contaminated with E.coli 0157. With E.coli infections increasing worldwide and new strains expected to keep emerging, this pathogen has become a major global public health issue.

So it is no surprise to learn that the EU-funded PEN (Pathogenic E.coli Network) project, set up in 2007 under the Food Quality and Safety theme within Framework Programme 6, had a very simply stated aim: to reduce the burden of illness related to the E.coli bacterium, in particular E.coli 0157.

The background against which the project started work was both a daunting and an urgent one. In spite of considerable past research, there were still areas where a fundamental understanding of E.coli was lacking. Moreover, technical issues and a lack of harmonisation - between academic disciplines, between the various elements of the food-chain, and between continents - meant that the results of much previous research had not been put to optimal use.

Meanwhile, the impact of E.coli infections was all too plain to see. On top of the toll in lives and human illness, E.coli infections had economic consequences as well – lost working days, adverse publicity for the countries and companies involved, with resulting losses of tourism, sales, market share and profits.

Co-ordinated by the Irish agriculture and food development authority, Teagasc, the PEN project involved 35 international research groups in a three-year work programme designed to improve and disseminate understanding of all aspects of E.coli. These included its molecular make-up, ways of detecting it, understanding how it spreads, assessing how virulent any given strain may be, and how outbreaks can be better controlled and managed in the future.

Given the global nature of E.coli, an important feature of the project was that its 35 partner organisations were drawn not just from Europe but from around the world, with institutes from Australia, Chile, Israel, New Zealand and the USA all taking part.

Building on this extensive participation, one of Pens' key successes was the creation of a single platform to disseminate information and expertise about E.coli around the world, for the benefit of everyone involved in the effort to understand and manage this threat - from microbial researchers to regulators, legislators, the food industry and public health experts. The project went on to develop science-based risk-management strategies tailored for use both by farmers and by the food-processing industry, and provided information and guidance for public health professionals and regulators on ways to detect, assess and manage newly emerging strains of E.coli.

The legacy of PEN is clear. By bringing together such an eminent and multidisciplinary group of researchers from around the world, it resulted not only in far greater understanding of the scourge of E.coli. It also – just as importantly – provided an efficient way of disseminating that information, for the benefit not just of European but of global food safety and public health.

As the Japanese incident and countless others have demonstrated, when E.coli outbreaks occur, swift and effective action is vital. Today, thanks to PEN, the world is better placed than ever to meet that challenge.

BEE SHOP

Keeping life sweet: protecting the purity of one of our oldest foods

Participants

Germany *(Coordinator), Spain, France, Italy, Sweden, Slovakia, United Kingdom*

http://ec.europa.eu/research/biosociety/food_quality/projects/115_en.html

FP6	*Proj. N°*	*22568*	*Total costs:*	*€ 2 610 000*	*EU contribution:*	*€ 1 860 000*	*Duration:*	*from:*	*Mar. 2006*
								to:	*Aug 2009*

Honey has been a part of human life since ancient times. Cave paintings in Valencia, in Spain, suggest that humans hunted for honey at least 10,000 years ago. Ancient Egyptians used honey to embalm the dead, and traces have even been found in the tomb of Tutankhamun.

Alongside its role as a foodstuff, the practical health benefits of honey have also long been recognised, although it is only recently that honey's antiseptic and antibacterial properties have been properly understood. Not by chance, it would seem, is honey one of the five elixirs of immortality in Hinduism.

For all this, honey in the 21st century faces some serious threats – in spite of a range of European and national regulations designed to control its quality.

Increasing environmental pollution, together with the widespread use of chemicals in agriculture, is affecting the nectar foraged by honeybees, putting the honey itself at risk of pollution. At the same time, the use of chemicals to treat honeybee diseases puts honey at risk of contamination by toxic substances.

It was to address these threats that the BEE SHOP project was set up in 2006, bringing together nine leading European honeybee research groups. With nearly € 2 million of funding provided under the Food Safety and Quality theme of the EU's 6th Framework Programme, the project was designed to pool the expertise of the research groups across a range of specialist areas including honey quality, pathology, genetics and honeybee behaviour.

The overriding aim of the consortium was to ensure honey quality by reducing the potential sources of contamination, whether these arose from bees foraging in nectar contaminated with insecticide, or from the chemicals used to treat honeybee disease.

In the words of BEE Shops' co-ordinator, Professor Robin Moritz of Martin-Luther-University in Halle, Germany: "Since there is an increase in honeybee diseases, novel chemotherapies have been developed. Typically, most bees are susceptible to diseases, but there may be strains that are less susceptible and we are in search of these."

Against this background, one of BEE Shops' most ambitious intentions was to start the process of completely eliminating the need for chemicals to treat and control honeybee disease.

One innovative result of the project's work was the development of molecular tools for the selection of disease resistant colonies – an advance made possible by the completion of the sequencing of the honeybee genome. Since individual genes control specific disease resistance in honeybees, the ability to select stock, together with methods to control mating, should now enable this ambition to be realised.

In parallel with this, BEE-SHOP researchers also identified behavioural and physiological mechanisms in bees, in order to help control the way in which they forage for nectar and so avoid contaminated nectar sources. Other initiatives included the investigation of pathogens affecting honeybees – in particular their virulence and their transmission pathways, as well as the resistance levels of different honeybee strains.

By significantly adding to our understanding of honeybees' behaviour, disease patterns and genetic characteristics, the three and a half year BEE SHOP project undoubtedly made a major contribution to the goal of preserving the quality of European honey. This is of direct benefit not only to all consumers, but also to Europe's honey producers.

Thanks to BEE SHOP, the future one of the oldest foodstuffs known to humanity looks secure. For Europe's honeybees, honey producers and consumers, life will continue to be sweet.

VEG-I-TRADE

Globalisation and climate change: The two world wide threats to food safety

Participants

Belgium *(Coordinator), Denmark, Egypt, The Netherlands, Germany, India, Serbia, Spain, France, Italy, Norway, Brazil, Sweden, Slovenia, Switzerland, South Africa*

www.veg-i-trade.org									
FP7	Proj. N°	244994	Total costs:	€ 7 600 000	EU contribution:	€ 6 000 000	Duration:	from:	May 2010
								to:	May 2012

With the global population set on a rapidly rising path towards 9 billion, the challenge facing the world's food supply is clear to see.

Within that food supply, fresh produce plays a vital part. But just as demand is rising, so are serious safety concerns. Recent disease outbreaks and rapid alerts linked to fresh produce have clearly highlighted the threat.

Two closely linked factors can be seen as major contributors to the safety risk – climate change and the increasing globalisation of trade.

While globalisation means our food comes from ever more diverse parts of the world, making it harder to monitor and manage safety systems and procedures, climate change is likely to result in significant changes to the ways in which crops are cultivated and treated. Evidence is already emerging that such changes have important implications for food safety.

Established in 2010 and planned to run for four years, VEG-I-TRADE is a groundbreaking project, funded by the EU under its 7th Framework Programme, with the specific aim of providing reliable methods to assess the impacts of climate change and globalisation on food safety, and to develop response mechanisms to eliminate or minimise the resulting risks.

With 23 partner organisations, including universities, research institutes, SMEs and large industrial companies, VEG-I-TRADE has a truly international scope, which matches the global nature of the issues it is addressing. Participants come not only from around Europe, but also from Egypt, India, Brazil and South Africa.

The approach is to assess food safety in terms of both microbiological and chemical hazards. The microbiological hazards include a list now frighteningly familiar to the newspaper-reading public: VTEC, Salmonella, Norovirus, Cryptosporidium and Giardia. Chemical hazards included pesticide residues and mycotoxins – the poisons produced by fungi or mould.

A guiding principle of the VEG-I-TRADE project is its comprehensive, 'fork to farm' view of the fresh food production chain. This means it is focusing on the consumer, not just on crop cultivation, but all pre- and post-harvest processing, and also the water used at all stages of the process.

Early achievements so far include the development of a microbial sampling and analysis tool. By using this at various stages in the crop cycle, and including water and all food contact materials such as packaging in the tests, it is possible to build a 'microbial profile' of a given production process.

Methods of detecting Norovirus in water used in both irrigation and processing have been evaluated, and the most effective one identified and selected.

Meanwhile, against a background of increasing evidence that climate change is affecting the transmission of food- and water-borne diseases, VEG-I-TRADE is investigating the impact of this on toxin-producing moulds and the production of mycotoxins, as well as the development rate of various pests and the effects of climate change on pesticide use and residues.

Due to run until 2014, the extensive work of VEG-I-TRADE still has a long way to go. However, the outline of its end-results is already clear, safer food, better information for consumers, as well as reliable risk-analysis and risk-management techniques for policy-makers.

And last, but by no means least: guidelines and tools to help the food industry aspire to, and achieve, best food safety practice. In an industry where reputation is vital – and easily shattered in the wake of a contamination incident – no-one can afford to ignore this highest priority of all.

BACCARA

Helping our forests survive the threat of climate change

Participants

*Germany, The Netherlands, **France** (Coordinator), Italy, United Kingdom, Poland, Sweden, Spain, Switzerland, China*

www.baccara-project.eu									
FP7	Proj. N°	226299	Total costs:	€ 4 100 000	EU contribution:	€ 3 000 000	Duration:	from:	Jan. 2009
								to:	Dec 2012

Forests are a key resource for the planet. They play an important role in preserving biodiversity, they are a source of natural, renewable materials, and by absorbing carbon dioxide they play a crucial role in combating the greenhouse effect.

In Europe, which accounts for 25% of the world's forests, forestry and associated industries employ some 4 million people.

But our forests today face perhaps their biggest challenge yet - climate change. Forests are complex and finely-balanced ecosystems, and even small climate changes could have major repercussions, potentially even causing forests to die out.

Climate change means higher temperatures, changed patterns of rainfall, changed levels of carbon dioxide in the atmosphere and an increased frequency of extreme weather events. It leads to longer growing seasons and accelerated water loss. And it is likely to result in more fires, droughts, landslides and insect and disease outbreaks.

It does not require a great deal of imagination to appreciate the catastrophic effects these developments could have on forest ecosystems.

The difficulty lies in predicting specifically what those effects are likely to be so that effective planning can be started.

The EU-funded BACCARA project was set up to help forestry managers address exactly this problem.

Rather than leave the future of Europe's forests to chance or guesswork, the aim of the four-year project, set up in 2009, is to develop the scientific basis needed to enable forest managers and policy makers to evaluate the specific risks to European forests resulting from climate change.

Bringing together 15 research organisations from around Europe, plus Peking University in China, BACCARA is constructing a 3-dimensional risk assessment model, linking climate change, functional diversity and forest productivity.

Within this framework the first objective is to study the effect of climate change on forest biodiversity, in particular by improving our understanding of the impact climate conditions have on the ecological factors which determine which trees flourish and which decline, for example due to their resistance to pest or pathogen outbreaks.

The second objective is to understand how forest biodiversity affects forest productivity. Here, the researchers are studying the significance of three different aspects of tree species variation: their richness (how many different species are there?), their functional diversity (how dissimilar are they?), and their composition (which are they?).

Using the results of these investigations, the ultimate objective is to predict the most likely impacts of climate change on forest productivity. This would be achieved by mapping the probabilities of various climate change scenario onto the perceived susceptibility of forests to climate change. From this, it will be possible to make science-based estimates of the most likely impacts of climate change on forest productivity, tailored for various forest categories.

Because of this innovative research, BACCARA will produce two important sets of guidelines. The first, entitled "What to Grow", provided forest managers with a guide to which tree species to maintain, to introduce or to avoid, based on various climate change scenarios and forest categories.

A second guide, "What to Combat", detailed lists of pest and pathogen species to manage in order to prevent outbreaks.

As a result of the BACCARA project, a key part of the planet's ecosystem would no longer dependent on just 'hoping for the best.'

For the first time, forest managers and policy makers may have the means to plan for a secure future – even in the face of climate change.

CONFFIDENCE

Improving food safety for the European consumer

Participants

The Netherlands *(Coordinator), Germany, Italy, Belgium, Spain, Denmark, Finland, United Kingdom, Switzerland, Czech Republic*

http://www.conffidence.eu/									
FP7	*Proj. N°*	*211326*	*Total costs:*	*€ 7 500 000*	*EU contribution:*	*€ 5 800 000*	*Duration:*	*from:*	*May 2008*
								to:	*Dec. 2012*

The safety of the food we eat is always high on the public agenda. With food contamination incidents hitting the headlines on a regular basis, consumers are increasingly aware of the risks associated with a wide range of foodstuffs.

The ever-more globalised sourcing of our food only heightens these concerns. From a European perspective, it is important to do everything possible to ensure the safety not only of food produced within our borders, but also of the food, we import from overseas markets.

While tools exist to test the safety of food and animal feed, they are time-consuming and expensive.

It was this situation, which led to the setting up in 2008 of CONffIDENCE – a four-year project majority-funded under the EU's 7th Framework Programme. The aim of the project was to develop faster, more cost-efficient methods to detect a broad range of contaminants in food and feed.

One area in which the project has already met with success is detecting contaminants in honey, a product that is often associated with high levels of antibiotics. These antibiotics are used to treat infections in beehives, but residues can show up in the honey itself.

The effect, when consumed by humans, can be to increase antibiotic resistance.

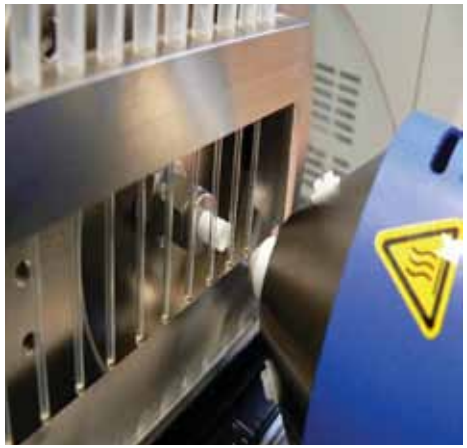
Honey contaminated in this way is banned from entering the EU, but often it is not picked up until very late in the distribution chain.

CONffIDENCE scientists have now produced a multi-dipstick, which can test honey for four different classes of antibiotics at once, at a much faster rate than ever before.

"Until now there haven't been any rapid tests that can detect more than one class of antibiotics at once," says CONffIDENCE project co-ordinator Dr Jacob de Jong of RIKILT, the Institute of Food Safety in the Netherlands. "But this new test not only does that, but it can be used in field conditions."

The new test is currently in its final testing stages. It is hoped it will become commercially available in 2012.

However, it does not stop with antibiotics in honey. Drawing on the expertise of thirteen universities and research institutes, two large food and feed companies and one SME, the CONffIDENCE consortium is investigating methods to improve the detection of a wide range of the most dangerous contaminants we face – including persistent organic pollutants (POPs), pesticides, heavy metals, veterinary drugs and biotoxins such as shellfish toxins and the mycotoxins produced by moulds and fungi.



In particular, the project is focused on developing detection methods, which will be effective when, used to test a number of specific products seen to be of most relevance for consumer safety. As well as honey, these products include fish and shellfish, cereals, eggs, meat, vegetables, dairy products, fish feed and cereal-based animal feed.

Due to be completed in December 2012, the € 7,5 million project aims to have produced several new detection tools that will enable faster and more efficient testing and analysis across the entire range of foods we consume on a daily basis.

The results will be more contaminations caught much earlier, millions of euros saved for the European food industry as recalls and food-scares are avoided – and above all, as the project's very name emphasises, that most important commodity of all, greater confidence for the European consumer.

PARADIGM

Future biodegradable materials for a better quality of life

Participants

Sweden *(Beneficiary)*

http://www.nature.com/news/2011/110421/full/news.2011.255.html									
FP7	Proj. N°	246776	Total costs:	€ 2 500 000	EU contribution:	€ 2 500 000	Duration:	from:	Mar. 2010
								to:	Feb. 2015

In these times of economic crisis, eco-friendly plastic bags could be key in reconciling economic and industrial growth with sustainability.

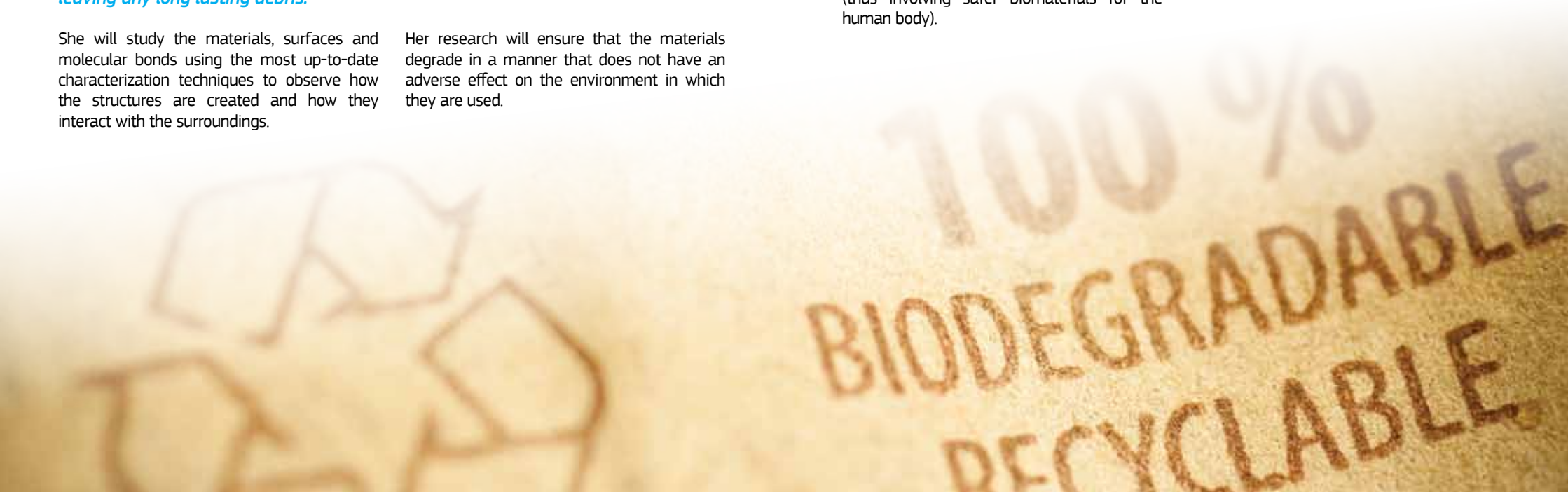
Supported by a European Research Council's Advanced Grant 2009, Professor Ann-Christine Albertsson aims at creating a new generation of materials that mimic nature's structural organization and that biodegrade in a controlled manner without leaving any long lasting debris.

She will study the materials, surfaces and molecular bonds using the most up-to-date characterization techniques to observe how the structures are created and how they interact with the surroundings.

Her research will ensure that the materials degrade in a manner that does not have an adverse effect on the environment in which they are used.

These versatile customized structures will help our understanding of the way polymeric materials should be designed and how they could contribute to enhancing our quality of life in two main areas: sustainable commodity plastics and tissue engineering applications (thus involving safer biomaterials for the human body).

New sustainable materials would finally revolutionize the way traditional plastic-like materials have behaved until now and could have direct applications in many sectors of activities (agriculture, medical research…)



AFRICA GHG

The role of African tropical forests in fighting climate change

Participants

Italy *(Beneficiary)*

http://gaia.agraria.unitus.it/									
FP7	Proj. N°	247349	Total costs:	€ 2 400 000	EU contribution:	€ 2 400 000	Duration:	from:	Apr. 2010
								to:	Mar. 2014

It is increasingly recognized that Africa is very vulnerable to climate change. However, until now it has not been clear whether it is a net carbon absorber or emitter because of the lack of studies on the carbon cycle in representative African ecosystems, notably tropical forests.

A project funded through an ERC Advanced Grant and led by Professor Riccardo Valentini, is trying to tackle this issue.

As one of their objectives, the researchers are trying to determine the impact of forest degradation and deforestation on carbon and other greenhouse gas (GHG) emissions, in the continent with the highest deforestation rate in the world.

They also aim to achieve a better understanding of the role of the African tropical rainforest on the GHG balance (especially on the global methane and N2O emissions).

In this very innovative project, methodology will include in-situ measurements and the estimation of large scale, continental GHG dynamics using remote sensing techniques and advanced modelling - taking advantage of the researcher's previous experience in the studies on European forests, and of gas measurement towers throughout the world.

CONANX

Impact of social concerns about food on policies and businesses

Participants

United Kingdom *(Beneficiary)*

http://www.sheffield.ac.uk/geography/staff/jackson_peter									
FP7	Proj. N°	230287	Total costs:	€ 1 700 000	EU contribution:	€ 1 700 000	Duration:	from:	Jan. 2009
								to:	Dec. 2012

Food safety and security are high priority issues for the European Union at present and are at the core of current concerns of citizens, media and academics. With few exceptions, academic research on food has been fragmented, with too little interaction between food scientists, health researchers and social scientists.

With the support of a European Research Council's Advanced Grant, Professor Peter Jackson aims to take forward previous findings regarding the socially embedded nature of contemporary food choice and to understand better contemporary consumer anxiety.

The first phase of this ERC-funded project aimed at explaining the extent to which consumers' anxieties shape all points of the contemporary food systems along the supply chain ("from the farm to the fork"). This includes considering various issues, from international food security, domestic food hygiene to public health and doing so at a range of geographical scales, from international food markets to individual households.

The "proof of concept" grant he received from the ERC in October 2011 will help Prof Jackson to go a step further in making recommendations on a wider range of topics, from quality and provenance of food, to innovations in food labelling, marketing and consumer practice.

The project will test the market for these new ideas with a view to providing consultancy services to various groups (manufacturers, retailers, food service organisations and agencies) so that they are better equipped to interpret and respond to consumers' concerns about health and food safety when developing new products.

It could eventually also lead to tangible effects in terms of public health, including the reduction of obesity, diabetes and coronary heart disease.

European Commission

Investing in success - Developing a Bioeconomy using resources from land and sea.

Luxembourg: Publications Office of the European Union

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KI-31-12-555-EN-C

With the world population approaching 9 billion by 2050 and natural resources finite, Europe needs renewable biological resources for secure and healthy food and feed, as well as for materials, energy, and other products.

The Commission's strategy and action plan "Innovating for Sustainable Growth: a Bioeconomy for Europe" outlines a coherent, cross-sectoral and inter-disciplinary approach to the issue.

The goal is a more innovative and low-emissions economy, reconciling demands for sustainable agriculture and fisheries, food security and the sustainable use of renewable biological resources for industrial purposes, while ensuring biodiversity and environmental protection.

This booklet presents a selection of projects that show Europe's investment in Research and Innovation as the cornerstone of the Bioeconomy strategy.

http://ec.europa.eu/research/bioeconomy/

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