



European  
Commission



*EU research*

# Environment and Health

*Research and  
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# Environment and the health of EU citizens

*The best scientific evidence now indicates that chemicals in our air, water, soil, food, homes, schools and work places can be important causative factors in many human diseases and health conditions. The European Union is concerned about this problem and is supporting research aimed at better understanding the risks.*

Until now, work in the area of environment and health has tended to be fragmented, with scientists operating in different countries under their own national research programmes, and medical, public health and environmental groups also working in relative isolation.

The EU's Seventh Framework Programme for Research and Development, managed by the European Commission, represents a coherent programme aimed at ensuring the best use of Europe's collective resources. It is currently supporting important research projects seeking to better understand the health implications of environmental factors, including climate change.

## Research priorities

The first task for researchers is simply to better **understand** the extent to which we are exposed to environmental stressors and **how** potentially dangerous environmental **pollutants affect human health**. EU projects in this area cover a

range of issues around air, water and soil quality. Specific topics being investigated include the role of air pollutants such as particulate matter outdoors and volatile chemicals indoors, or how climate change will alter the spread of pathogenic agents. Exposure to chemicals in women is of concern for reproductive health.

Research also includes work aimed at **tackling new and emerging threats**. Examples here are the potential health effects of the more and more prevalent wireless networks that are increasing human exposure to electromagnetic radiation, and the emergence of nanotechnologies.

EU research brings together the scientific community and reinforces coordination between key European research groups, but it also serves a critical function in terms of **supporting government policy**. EU-funded projects are tackling some of the key scientific issues that need to be addressed in the development and implementation of, for example, ambient air quality or water pollution legislation. Aside from this, the positive effect of the environment on health is also being explored by researchers and there is increasing evidence to show that close contact with nature is beneficial to human health and well-being.

In these and many other areas, the Commission believes diverse and inclusive collaboration is essential to success as we move towards the common goals of reducing public exposure to environmental toxicants and developing more effective prevention and mitigation strategies.



# Understanding how pollutants affect human health

*Identifying and characterising real cause-and-effect relationships between human health and pollutants and other chemicals in the environment is a complex and resource-intensive task that needs to be addressed at EU level.*

What are the sources of these pollutants? How do they enter the human body? At what levels are they found in humans? Do they really affect human health? All of these questions need to be answered before we can even begin to develop an effective strategy to deal with the problem.

Another issue to consider is climate change, now seen by many as having its own potential impacts in terms of modifying exposure to hazardous environmental toxins and pathogens.

For instance, climate change will have a significant effect on the aquatic environment and how pollutants and micro-organisms are cycled through the biosphere. For example, the flux of many viruses is certain to be affected by alterations in the frequency or severity of water-related environmental events. How will these changes, in turn, affect our soil and air, the food web and, ultimately, human health?

## Knowing the problem

Understanding all of these effects is crucial to improving policies aimed at protecting citizens from toxic chemical, physical and biological hazards in the environment.

The EU-funded **ArcRisk** and **CLEAR** projects represent two examples where scientists are studying the links between environmental contaminants, climate change and human health. CLEAR is looking, in particular, at how contaminants impact the occurrence of reproductive disorders. Both of these projects are focused on the Arctic, where the effects of climate change are expected to be felt most severely.

Meanwhile, the **Atopica** project is assessing the health risks of changing pollen distribution for vulnerable allergic patients.

## Understanding the environment and reproductive health: DEER

*Scientists know that reproductive health in adulthood is largely dependent on normal endocrine-regulated development in early childhood. Completed in 2012, the EU-funded DEER project investigated the problem of declining reproductive health in Denmark and other countries, looking at the developmental effects of environmental contaminants. It revealed, among other things, that exposure to these substances can result in the advancement of the onset of puberty, particularly in girls. DEER has contributed significantly to our understanding of the links between normal and abnormal foetal and neonatal reproductive development, potentially forming the basis for new measures for the prevention of reproductive disorders.*





# Tackling new and emerging environmental threats

*New, emerging threats to the environment and human health can arise for a number of reasons. The challenge is to identify and assess new risks due to factors that may previously have been poorly recognised.*

For example, nanotechnologies have quickly become a major force for change across many industrial sectors, delivering new benefits as well as opportunities for growth. However, scientists have also raised concerns that their basic building blocks – particles smaller than one-billionth of a metre – could represent a potential new class of risk to health and the environment.

Meanwhile, a growing number of scientists and medical specialists are calling attention to dangers posed by man-made electromagnetic radiation. While some previously believed that the only way electromagnetic radiation could cause damage was through a heating effect, studies have now shown potential biological effects at intensities far too small to cause heating, including protein changes in skin, excited or damaged brain cells, and DNA damage.

## New lines of attack

Work in these areas has been very limited, and innovative approaches, tools and models are urgently needed, bringing together expertise from multiple scientific fields.

Importantly, manufacturers and service providers require better tools to provide a higher level of certainty about the evaluation of their products and installations. Similarly, policy-makers and regulators have difficulties when it comes to establishing safety guidelines, due to the lack of technically sound evaluation instruments and technologies.



## Modern communications and new health risks: Seawind

*Wireless devices are an integral part of modern society.*

*Throughout the EU, the majority of people are using these technologies for various purposes, and the number of applications is growing rapidly.*

*While research in recent years has concentrated on the potential health effects of handsets and other body-worn devices, less attention has been paid to wireless network devices.*

*The EU-funded Seawind project has been investigating how to better assess the potential adverse health risks of electromagnetic-field exposure due to the ubiquitous presence of network devices in everyday life. Project partners hope their work will fill some major knowledge gaps for a more rigorous risk assessment of wireless network devices.*

# Supporting policy

*The EU is moving forward rapidly with new legislation and policy developments as well as revisions in many environment and health-related areas. The European Environment and Health Action Plan encourages research which explores the links between environmental risk factors and human health. Among others, risk factors may include air pollution, chemical contaminants and noise. Now, more than ever, scientific support is needed to underpin policy-related activities.*

The unfortunate truth is that policy priorities do not always coincide with progress in scientific

understanding. If not grounded in strong scientific evidence, the implementation of new measures, however well-intentioned, may not result in benefits to human health.

Better tools for quantifying the real impacts of environmental and health measures will provide authorities with much-needed support for the development of better policies.

EU efforts to reduce greenhouse gas emissions is one area where EU-funded projects, such as **PURGE** and **Urgenche**, are helping policy-makers to better define potential health impacts and appropriate mitigation actions. Meanwhile, the **Viroclime** project is looking at waterborne disease outbreaks following extreme water-related climatic events and the health risks associated with them.

Another EU project, **PHENOTYPE**, is trying to build a solid evidence base that shows that regular exposure to the natural outdoor environment is beneficial to human mental and physical health.

All of these projects are providing key results to EU policy-makers working to develop more pertinent and more effective environment and health-related policies.



## Key contributions for EU air-quality legislation: *Escape*

*The EU-funded Escape project is delivering important new data on the long-term health effects of exposure to air pollution in Europe.*

*Specifically, the project is investigating exposure-response relationships and thresholds for adverse perinatal health outcomes and the development of diseases such as asthma in children. It is also looking at respiratory and cardiovascular issues in adults, and cancer incidence.*

*Project partners say current estimates of the health impact of especially fine particles in the air are imprecise. In addition, these figures are primarily based on studies carried out in North America. Escape is carrying out detailed and specific studies using more refined exposure assessment tools. Crucially, all of the information gathered will feed directly into the current revision of EU air quality-legislation.*

# Project List

**ARCRISK** - Arctic health risks: Impacts on health in the Arctic and Europe owing to climate-induced changes in contaminant cycling  
[www.arcrisk.eu](http://www.arcrisk.eu)

**ARIMMORA** - Advanced research on interaction mechanisms of electromagnetic exposures with organisms for risk assessment  
<http://arimmora-fp7.eu>

**ATOPICA** - Atopic diseases in changing climate, land use and air quality  
[www.atopica.eu](http://www.atopica.eu)

**BROWSE** - Bystanders, residents, operators and workers exposure models for plant protection products  
[www.browseproject.eu](http://www.browseproject.eu)

**CLEAR** - Climate change, environmental contaminants and reproductive health  
[www.inuenda.dk/clear](http://www.inuenda.dk/clear)

**CONTAMED** - Contaminant mixtures and human reproductive health - novel strategies for health impact and risk assessment of endocrine disrupters  
[www.contamed.eu](http://www.contamed.eu)

**COPHES** - European coordination action on human biomonitoring  
[www.eu-hbm.info](http://www.eu-hbm.info)

**CYTOTHREAT** - Fate and effects of cytostatic pharmaceuticals in the environment and the identification of biomarkers for and improved risk assessment on environmental exposure  
[www.cytothreat.eu](http://www.cytothreat.eu)

**DEER** - Developmental effects of environment on reproductive health  
<http://eu-deer.net>

**DENAMIC** - Developmental neurotoxicity assessment of mixtures in children  
[www.denamic-project.eu](http://www.denamic-project.eu)

**ENNAH** - European network on noise and health  
[www.ennah.eu](http://www.ennah.eu)

**ENRIECO** - Environmental health risks in European birth cohorts  
[www.enrieco.org](http://www.enrieco.org)

**ENVIROGENOMARKERS** - Genomics biomarkers of environmental health  
[www.envirogenomarkers.net](http://www.envirogenomarkers.net)

**EO2HEAVEN** - Earth observation and environmental modelling for the mitigation of health risks  
[www.eo2heaven.org](http://www.eo2heaven.org)

**ERA-ENVHealth** - Coordination of national environment and health research programmes - environment and health ERA-NET  
[www.era-envhealth.eu](http://www.era-envhealth.eu)

**ESCAPE** - European study of cohorts for air pollution effects  
[www.escapeproject.eu](http://www.escapeproject.eu)

**HEALTHY FUTURES** - Health, environmental change and adaptive capacity: mapping, examining and anticipating future risks of water-related vector-borne diseases in eastern Africa  
[www.healthyfutures.eu](http://www.healthyfutures.eu)

**HEREPLUS** - Health risk from environmental pollution levels in urban systems  
[www.hereplusproject.eu](http://www.hereplusproject.eu)

**HEROIC** - Health and environmental risks: Organisation, integration and cross-fertilisation of scientific knowledge  
[www.heroic-fp7.eu](http://www.heroic-fp7.eu)

**HITEA** - Health effects of indoor pollutants: Integrating microbial, toxicological and epidemiological approaches  
[www.hitea.eu](http://www.hitea.eu)

**ICEPURE** - The impact of climatic and environmental factors on personal ultraviolet radiation exposure and human health  
[www.icepure.eu](http://www.icepure.eu)

**MOBI-KIDS** - Risk of brain cancer from exposure to radio frequency fields in childhood and adolescence  
[www.mbkds.com](http://www.mbkds.com)

**OFFICAIR** - On the reduction of health effects from combined exposure to indoor air pollutants in modern offices  
<http://www.officair-project.eu/>

**PHARMAS** - Ecological and human health risk assessments of antibiotics and anti-cancer drugs found in the environment  
[www.pharmas-eu.org](http://www.pharmas-eu.org)

**PHENOTYPE** - Positive health effects of the natural outdoor environment in typical populations in different regions in Europe  
[www.phenotype.eu](http://www.phenotype.eu)

**PURGE** - Public health impacts in urban environments of greenhouse gas emissions reduction strategies  
<http://purge.lshtm.ac.uk>

**QWECI** - Quantifying weather and climate impacts on health in developing countries  
[www.liv.ac.uk/qweci](http://www.liv.ac.uk/qweci)

**SEAWIND** - Sound exposure and risk assessment of wireless network devices  
[www.seawind-fp7.eu](http://www.seawind-fp7.eu)

**SYSTEQ** - The development, validation and implementation of human systemic Toxic Equivalencies (TEQs) as biomarkers for dioxin-like compounds  
[www.systeoproject.eu](http://www.systeoproject.eu)

**TRANSPHORM** -Transport related air pollution and health impacts – Integrated methodologies for assessing particulate matter  
[www.transphorm.eu](http://www.transphorm.eu)

**VIROCLIME** - Impact of climate change on the fate, transport and risk management of viral pathogens in water  
[www.viroclimate.org](http://www.viroclimate.org)

**URGENCE** - Urban reduction of GHG emissions in China and Europe  
[www.urgence.eu](http://www.urgence.eu)

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*Research and Innovation policy*



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