



## **2019 ERA-ENVHEALTH\* Open Conference on Circular economy**

**5 November 2019**

**Hosted by ANSES**

**14 rue Pierre et Marie Curie  
94700 Maisons-Alfort, France**

**9:00-16:30**

**“Copernic” building, room “Ramazzini”**

## **Programme and abstracts**

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\* European Research Area Environment and Health (former FP7 project)



## Programme

We can no longer afford to ignore the numerous and tremendous challenges faced by the planet and by mankind which include unsustainable consumption, climate transformations, demographic growth and its territorial distribution (urbanisation and ageing of the population), environmental degradation, scarcity of natural resources, etc. To address these challenges, one of the approaches – promoted for instance by administrations, NGO's or firms, is the development of a **circular economy**. This is on the verge of becoming “the perfect solution”. Even if the concept exists since the 1970's, the current context encourages the growth of circular economy in new public policies, at regional, national and local levels, and new commitments by citizens and various private actors.

Concept, model or pattern: clearly the definition of circular economy varies according to the countries, actors and institutions, as well as the shape, scope and ranking of social and economic changes which can be associated with it. Nevertheless, some general features of a circular economy are shared. It represents a canvas of interactions and retroactions between a large range of socioeconomic entities, activities and flows, towards smarter production, property and consumption habits. In short, the well-known principle of “nothing is lost, everything is transformed” is doubled by the “do better with less” one. In the same time, mainstream approaches to circular economy are still often reduced to, and regulated for, waste and recycling, and energy management, in view of green growth. There is still a **lack of consideration of public, environmental and occupational health dimensions** when compared with economic and environmental aspects, and more broadly, for the potential **adverse impacts** of circular economy<sup>2</sup>. This raises the question of how scientific and risk assessment bodies can integrate circular economy in their work and in their relevant risk assessment.

To ensure the integration of health and safety aspects in the global understanding and implementation of circular economy, to comprehend or even anticipate the wide range of its impacts as much as possible, discussion is necessary on:

- ✓ the origins and mechanics of the weak position of health in circular economy policies and initiatives, and possible levers to change this and promote health in the this context;
- ✓ the assessment of existing and potential environmental and health risks associated to circular economy (such as risks due to chemical mixtures in waste and reuse relocation of externalised activities; transport; logistics; automation, etc.); including discussion on the methods, results and limits of the assessments as well as their political and economic impacts;
- ✓ the intersections (synergy or antagonism) of the various aspects including health, safety and life cycle analysis and sustainability in risk assessments and the balancing of health, social, environmental and economic costs and benefits of circular economy.

**The ERA-ENVHEALTH conference on circular economy aims to examine these questions and to exchange on the work carried out on these issues in the different participating institutions.**

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<sup>2</sup> WHO/EURO (2018). Circular Economy and Health. Risks and Opportunities. Bonn



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**9:00-9:30** *Registration and Coffee*

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**9:30-9:40** **Welcome by ANSES - Matthieu Schuler**

Director of the Risk Assessment Department  
French Agency for Food, Environmental and Occupational Health & Safety  
(ANSES)

**9:40-10:00** **Opening speech: Circular economy in Europe: definitions, practices and challenges**

Marie-Anaïs Berline  
French institute of circular economy

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**10:00-12:15** **Session 1: Frameworks and general issues**

**10:00-10:30** **Circular economy and health: making the most of the opportunities for sustainability**

Marco Martuzzi  
World Health Organization  
*by videoconference*

**10:30-11:00** **Workers in a Circular Economy: current and future issues**

Fanny Debil and Marc Malenfer  
ANSES and French National Research and Safety Institute for the Prevention  
of Occupational Accidents and Diseases (INRS)  
France

**11:00-11:30** **A blueprint for safe and sustainable material loops in a circular economy. A proposal for a tiered modular framework to assess options for material recycling.**

Johannes Lijzen  
National Institute for Public Health and the Environment (RIVM)  
The Netherlands

**11:30-12:00** **Circular economy, waste, health and the French Environment & Energy Management Agency: needs and results**

Isabelle Déportes  
Agency for the Environment and Energy Management (ADEME)  
France

**12:00-12:15** **General discussion**



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**12:15-13:00** *Lunch Buffet*

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**13:00-15:45** **Session 2: Case studies. Circular Economy, health and environmental specific issues**

13:00-13:30 **Circular Economy and Air Pollution: time for change**

Borrego C.  
Aveiro University  
Portugal

13:30-14:00 **Assessing the risks related to the recovery of former foodstuffs in animal feed – focus on two different issues**

Charlotte Dunoyer  
ANSES  
France

14:00-14:30 **Circular Economy and health in contaminated areas**

Fabrizio Bianchi and Liliana Cori  
National Research Council  
Italy

14:30-15:00 **Assessment of recycling of diapers and incontinence materials. *Step-by-step plan and risk assessment framework for potential risks of substances and pathogens in products***

Johannes Lijzen  
National Institute for Public Health and the Environment (RIVM)  
The Netherlands

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**15:00-15:15** *Coffee break*

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15:15-15:45 **Possible risks related to the use of rubber granules derived from the recycling of used tyres in various synthetic grounds: state of knowledge, remaining uncertainties and controversies**

Pierre Lecoq and Fanny Debil  
ANSES  
France

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**15:45-16:15** **Session 3: Open discussion**

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**16:15-16:30** **Session 4: Conclusions and closing of the conference**

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## Abstracts

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### **Circular economy in Europe: definitions, practices and challenges**

*Marie-Anaïs Berline*

*French institute of circular economy, France*

The production and consumption model that has prevailed since the industrial revolution is based on abundant natural resources and a linear pattern (extraction, production, consumption, waste). Yet our harvesting of natural resources already far exceeds the biocapacity of the earth.

Circular economy aims to decouple the creation of societal value (integrating well-being and population health) from the impact on the environment, through optimized management of resources. This model involves the implementation of more sober and efficient modes of design, production and consumption (eco-design, industrial and territorial ecology, performance-based services, etc.) and considers waste as resources.

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### **Workers in a Circular Economy: current and future issues**

*Fanny Debil<sup>a</sup> and Marc Malenfer<sup>b</sup>*

*a: French Agency for Food, Environmental and Occupational Health & Safety (ANSES), France*

*b: French National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases (INRS), France*

Including health in the understanding and practice of circular economy is a tremendous challenge. Considering the various features and definitions of health is a further issue. That is the goal of this presentation, partly based on a foresight study coordinated by the French Institute for occupational safety and health between 2017 and 2019. This study explores the possible consequences on working conditions of the transition from a linear economy model to a circular one, more respectful of the environment and with a lower raw materials and energy consumption. Four scenarios depicting contrasted overall options in the development of circular economy by 2040 have been written:

- a circular economy driven by globalization
- an European political voluntarism
- linear globalization
- transition managed locally

The aim of these scenarios is mostly to embody the main characteristics of work (conditions) likely to evolve in the decades to come, in a context of development (more or less fast) of a circular economy. Within this framework, different aspects, such as eco-design, maintenance, logistics or traceability, and their consequences on human health are discussed.

Circular economy can imply major changes of nature and organisation of work, notably in design and production of raw materials, not only waste management. In the same time, the potential resulting occupational risks are not necessarily new. Besides, they can echo as much as they can contrast environmental health issues.

To illustrate these questions and to underline the importance of the technological factor, two sectors - end-of-life vehicles and electric and electronic devices – are described.

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**A blueprint for safe and sustainable material loops in a circular economy. A proposal for a tiered modular framework to assess options for material recycling.**

*Johannes Lijzen*

*National Institute for Public Health and the Environment (RIVM), the Netherlands*

RIVM has laid the foundations of a framework to assess whether raw materials from waste can be used safely and sustainably. In this integral approach, the risk assessment of a substance is compared with the benefits of its reuse for the environment, e.g. how much CO<sub>2</sub> emissions are reduced. By making both explicit, it becomes clear what is needed to adequately limit the risks to man and the environment and what that effort will contribute towards sustainable development. On the basis of this information, both industry and policy makers can make an assessment of the use of recovered raw materials. Other values, such as economic costs and social acceptance, have not yet been taken into account.

The framework integrates legally established rules, existing risk limits and new methods into one coherent, tiered system. In this way, it supports the Dutch government's basic principle of dealing efficiently with raw materials and reducing the burden on the environment.

Safety for man and the environment is a precondition for the transition to the circular economy; an economy which maximizes the reuse of materials from waste streams wherever possible. Material that is recycled may present risks to the environment if it contains substances of very high concern (ZS), drug residues, pesticides or pathogens. Legislation and policy frameworks protect against some of the risks but are not comprehensive enough to prevent the risks currently presented by recycled material. For example, while the regulations prohibit the use of substances in new products, such as fire retardants, there is no legislation available for products, which were made before the prohibition was enforced. In addition, regulations may be missing, such as those for controlling drug residues.

The framework has been tested with three cases: recovering phosphate from waste water, recycling polystyrene foam and using rubber granulate from old car tires. RIVM would like to discuss the practical application of the framework, and its further development, with the government and industry. By expanding the framework with other safety and sustainability themes, it will become more widely applicable.

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**Circular economy, waste, health and the French Environment & Energy Management Agency: needs and results**

*Isabelle Déportes<sup>a</sup>, H  l  ne Desqueyroux<sup>b</sup>*

*a: Circular Economy and waste Division, Waste Identification and Management Service, 20 Avenue du Gr  sill  , BP 90406, 49004 ANGERS CEDEX 01, France, [isabelle.deportes@ademe.fr](mailto:isabelle.deportes@ademe.fr) ;*

*b: Prospective and Research Executive Division, 155 bis avenue Pierre Brossolette – 92120 Montrouge, France, [helene.desqueyroux@ademe.fr](mailto:helene.desqueyroux@ademe.fr)*

The French Environment & Energy Management Agency (ADEME) participates in the implementation of public policies in the fields of environment, energy and sustainable development. It puts its expertise and consulting capacities at the disposal of companies, local authorities, public authorities and the general public, in order to enable them to progress in their environmental approach. ADEME is a public institution under the joint supervision of the Ministry of Ecological and Solidarity Transition and the Ministry of Higher Education, Research and Innovation.



The Agency also supports projects financing, from research to implementation, in the following areas: waste management, soil conservation, energy efficiency and renewable energies, materials savings air quality, the fight against noise, the transition to the circular economy and the fight against food waste. ADEME is involved in every stage of the scientific research and the innovation process through three complementary instruments: the thesis programme, research programmes and the Investments for the Future Programmes (PIA). This last instrument focuses on market-oriented (?) innovations.

The main results of three projects will be presented. The projects were selected through a research program aiming at helping laboratories to assess health risks linked to waste management.

The first project is called 4éCOS : and it assessed emissions, exposures and health risks associated with an eCOSite activities. Its objectives were i) to supply complementary information in terms of relevant emerging compounds, in order to improve the impact studies relative to waste treatment channels, ii) to assess exposures and risks using exposure measurements.

The second project, CEVSAB, implemented a veterinary disease reporting tool for urban sewage sludge spreading

The third project is called GEO3N and it studied the influence of environmental exposure to dioxins (through air and diet) on breast cancer risk within the E3N cohort. The air exposure included wastes incineration sites.

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## **Circular Economy and Air Pollution: time for change**

*Carlos Borrego, Sandra Rafael, Sílvia Coelho, Bruno Augusto, Joana Ferreira, Myriam Lopes, Ana Isabel Miranda*

*Department of Environment and Planning & CESAM, University of Aveiro, Portugal*

With 7.7 billion people, the planet is already struggling to meet humanity's demands for food, land, air, water and other natural resources, and to absorb its wastes. The circular economy derive from the recognition that the current growth model, supported by the increasing consumption of natural resources and pollutant emissions, cannot be maintained in a world of finite resources and in the limited capacity of the ecosystem. However, resource efficiency alone does not guarantee a decrease in resource use, because the amounts of resources that are used can still be excessive. For this reason, the challenge focused on ecosystem resilience must be integrated to achieve the sustainable development.

It is also an unquestionable fact that much has been done in the last decades to improve the quality of the air we breathe. But, our cities, where more than 80 per cent of the population will live by 2050, continue to show worrying and troubling signs of environmental stress, of which air pollution is the most critical. The city of the future must be able to produce its own food and energy, reduce and treat its waste, have water in quantity and quality, improve air quality and reduce human exposure. The solutions need to be innovative and must integrate new social and technological perspectives. Integrated assessment modelling tools allow to a cost-effective analysis and decision support on emission reduction strategies. On the other hand, nature itself is resource-efficient and can inspire or support innovation. Nature-based solutions will drive the transition to circular and smart cities, helping to strengthen resilience to climate change and improving the health and well-being of citizens.

This study evaluated the influence of a set of resilience measures, centred on nature-based solutions, in the wind flow and in the dispersion of air pollutants, in a built-up area in Portugal. Two pollutants were analysed (NO<sub>x</sub> – nitrogen oxides, and PM<sub>10</sub> – particulate matter with an aerodynamic diameter less than 10 µm) and four scenarios were developed: i) baseline scenario; ii) urban green scenario; iii) green roof scenario; iv) “grey” scenario (without trees). A combination of models was used to perform the set of numerical simulations, on hourly basis. The implementation of a green urban area promoted



a reduction of air pollutants concentrations of about 16% [PM10] and 19% [NOx] in the overall domain, while the application of green roofs showed an increase of concentrations (reaching 60% during specific time periods).

Overall, the results showed that the increase of urban resilience through functions and services of ecosystems (nature-based solutions) are key to improve the environment, combat climate change, increase the circularity in the city and promote human health.

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## **Assessing the risks related to the recovery of former foodstuffs in animal feed – focus on two different issues**

*Charlotte Dunoyer*

*French Agency for Food, Environmental and Occupational Health & Safety (ANSES), France*

The political commitment for the development of circular economy has been implemented through different regulations, such as the so-called “Grenelle II law” which requires the agri-food companies to value their bio-waste. More recently, the law against food waste (2016-02-11) has explicitly designated the “valuation for animal feed” as an option to fight against food waste.

As well as methanisation, animal feed has become a possible outlet for the agri-food companies, in search of recycling solutions for their “bio-waste”.

Thus, Regulation (EC) n° 68/2013 on the Catalogue of feed materials, defined former foodstuffs as: “foodstuffs, other than catering waste, which were manufactured for human consumption in full compliance with the EU food law but which are no longer intended for human consumption for practical or logistical reasons or due to problems of manufacturing or packaging defects or other defects and which do not present any health risks when used as feed.”

Circular economy applied to this type of recycling has indeed significant health issues:

- The animals fed with these “former foodstuffs” are bred, for many of them, as livestock, the products of which are intended to enter the food chain themselves. Food for humans is therefore often the final outlet for this circular economy.
- As a result, agri-food companies recycle then their “bio-waste” in a sector with food safety issues, and are asked to no longer consider these products as waste but as raw materials for animal feed. The conditions for recovery, storage and transport, for example, must be adapted to this market.
- In addition, food manufacturing includes the use of food additives for different purposes (food colouring, preservatives, texturing agents ...) which have not been provided nor evaluated for animal feed.
- Finally, the recycling of these former foodstuffs can take place at different stages of the production and distribution chain. Thus, raw products as well as packaged products can be harvested for circular recovery, which raises the question of the food-packaging interactions throughout the process of valuation, and in particular the unpacking of these products before incorporating them into animal feed.

In 2013, the French market for valuation of former foodstuffs was estimated at 190 000 tons of dry products and 100 000 tons of dairy products. However, the sector in France is less developed than in some neighboring countries of the European Union such as Spain, Germany, Belgium or the Netherlands.

In view of these health issues, ANSES has been asked by the French authorities to assess the risks for humans, animals and the environment, related to the use of former foodstuffs in animal feed.





The French authorities have particularly selected two terms of reference for the risk assessment:

- To assess the risk linked to the presence, in the former foodstuffs, of additives authorised for humans and not for animals;
- To assess the risk linked to the mechanical unpacking of former foodstuffs, resulting in a non-zero residue of packaging fragments in the raw material intended for animal feed.

The presentation gives the first results of these risk assessments and highlights the safety issues related to these particular situations of circular economy.

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## **Circular Economy and health in contaminated areas**

*Fabrizio Bianchi and Liliana Cori*  
*National Research Council, Italy*

The concept of circular economy is inspiring a profound reconsideration of the economic system at various levels and involving several disciplines. It is strictly linked to the concepts of sustainable growth, equity and equality, good health, including the protection of the environment and biodiversity. Moreover, as stated by WHO, "the change from a linear economy (take, make, dispose) to a circular economy (renew, remake, share) is expected to support significantly the attainment of the Sustainable Development Goals (SDGs), particularly SDG 12 on responsible consumption and production".

An economic system capable of self-healing or at least self-sustaining would undoubtedly bring significant net health benefits. The health benefits, strictly dependent on those on the natural and social environment, could be significant already in the transition to a circular economy.

However, if the complex and delicate transition phase, was moved and centered on a pure economic point of view, it could not adequately take into account health implications, underestimating the positive health effects as well as the risk of adverse health effects.

There are many gaps in knowledge regarding both positive and negative health impacts, and how these can affect exposed communities and in particular the most vulnerable groups. These aspects, as well as the protection of health as a primary asset, are also crucial under the economic point of view, considering direct and indirect costs of treating diseases and damages due to the premature loss of human lives.

To face the challenge of the circular economy for sustainability, it now appears insufficient how and how much economic methods are applied to translate health benefits into economic value or to compare the performance of alternative policies.

The World Health Organization (WHO) indicates the generation of evidence as a key points to fill the current knowledge gaps; the progress necessary for the interpretation of economic data in a health key; harmonization of approaches and methods in which economic instruments are applied and disseminated.

In a production and consumption system centered on the circular economy, and therefore on the use of renewable energies, on the re-use and durability of the product, the impacts on health should be evaluated and accounted along all the process, as well as at the end of the cycle.

The Health Impact Assessment (HIA), as a combination of methods and tools to carry out the screening-scoping-assessment-reporting-monitoring, can contribute as an appropriate tool for carry out process and product evaluations of circular economy in different application fields. HIA, as a tool for ex-ante evaluations of negative and positive impacts on the health of different actions and scenarios, is suitable to add information and recommendations to complete and support the planning, implementation and evaluation cycle. HIA is also a participatory process in all its phases, with suitable communication



instruments: it is a crucial element in the perspective of the circular economy, in which producers and consumers are by definition involved and responsible at different levels.

Health should find a significant place in a circular economy perspective with the support of a responsible governance of the whole process, involving all the relevant stakeholders and responding to the public interest of a modern and equal society.

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### **Assessment of recycling of diapers and incontinence materials. *Step-by-step plan and risk assessment framework for potential risks of substances and pathogens in products***

*Johannes Lijzen*

*National Institute for Public Health and the Environment (RIVM), the Netherlands*

Every year, more than 160 million kilos of used diapers for babies and incontinence material for adults end up in waste in the Netherlands. To reduce the amount of diaper waste, materials can be recycled and new products can be made. For example, plastic from diapers can be converted into plastic bottles for cleaning products.

It is important that these new products and materials are safe for people and the environment. To assess that, RIVM has developed a step-by-step plan. This allows recyclers of these materials to collect the necessary data to perform a risk assessment. Diapers and incontinence material contain pathogens and medicinal residues that people excrete through their urine and faeces. The diaper material itself contains plastics, cellulose and granules that absorb moisture.

The step-by-step plan also provides a method for licensing authorities to assess the risk of new products and materials. In addition to the risk assessment, licensing authorities and policy makers can look at other advantages and disadvantages, including sustainability. The producer remains responsible for the safety of his product. Two waste processors tested the step-by-step plan to make it practicable.

The first step in the risk assessment is a general and relatively strict assessment of potential risks. Meeting these strict criteria means that a choice can be made for a broad range of applications of recovered materials from the diapers. If a material or waste stream is potentially not safe to begin with, the next step tests whether the risks of pathogens or medicinal residues are sufficiently reduced during the recycling process. For example, pathogens can be killed by heating. If there are then still risks, a check is done to determine whether unwanted substances are released from the materials produced. If that is the case, specific products may be designed, from which the unwanted substances cannot be released.

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### **Possible risks related to the use of rubber granules derived from the recycling of used tyres in various synthetic grounds: state of knowledge, remaining uncertainties and controversies**

*Pierre Lecoq and Fanny Debil*

*French Agency for Food, Environmental and Occupational Health & Safety (ANSES), France*

Contributing to a circular economy, the upcycling of used tyres in the form of granules and other materials used in the production of synthetic grounds is one of the main ways for developing the economy of the French tyre waste management system. In the same time, at the national and international level, many concerns and public debates have emerged over several years with regard to the potential impacts of synthetic grounds on human health as well as the environment. In that context, and in line with other international assessments and analyses, the French Agency for Food,



Environmental and Occupational Health & Safety (ANSES) was mandated in 2018 to document the possible risks for human health and environment related to the use of materials from the recycling of used tyres. To do that, ANSES focused on carrying out a contextualised analysis of published data and works in progress, identifying knowledge needs to guide action and research priorities.

There is still no specific regulation on the ELT-derived rubber granules used as infill material in artificial sport pitches and most existing standards focus on the game quality offered by synthetic turf. Besides, the durability and dynamism of the debates on this topic, starting in North America and Northern Europe is noticeable. The controversies implying NGOs, citizens, media, have been persistent and tend to be focused on sport fields and chemical exposures. In this regard, available studies show indeed the presence of a wide variety of chemicals in granules, associated with other compounds in particular for the construction and maintenance of playgrounds. However, according to the existing studies, the human health risks (including carcinogenicity) is low or negligible. No increased incidence of cancers related to the installation and use of synthetic sports fields has been detected by epidemiological studies, despite of several publicised observations and alerts made by sport professionals. In the same time, concerning risks for environment, the available literature shows that tyres-derived rubber granulates have the potential to release some hazardous substances to the environment. In both cases, for health and environmental aspects, ANSES has identified sources of uncertainties, methodological limitations, and not or less investigated topics in the consulted publications.

Whereas no clear conclusions on health and environmental risks can be drawn, developing knowledge on artificial grounds is relevant, notably to carry out health risk assessment. Besides, the continuation of public debates suggest a need to deeply discuss the potential negative impacts of circular economy, and notably of the recycled products on the market.



## The ERA-ENVHEALTH network

### Collaboration in research to help tackle the challenges in environment and health and their policy implications in Europe

The European Environment and Health Action Plan for 2004-10 pointed a need to strengthen networks between researchers, policy-makers and stakeholders. The FP7 ERA-ENVHEALTH project was set up to bring together European organisations planning research in the Environment and Health (E&H) arena with the objectives of providing policy support. ERA-ENVHEALTH's task was to mobilise scientific research in support of European and national policies on E&H issues.

ERA-ENVHEALTH facilitates better communication and deeper understanding of the drivers and priorities in E&H for both scientists and policy-makers. ERA-ENVHEALTH is a unique active transnational network in the E&H field. ERA-ENVHEALTH has shown that transnational collaboration in E&H fills an important niche and the network is an innovative forum to discuss challenges, visions and emerging issues. In this respect, access to, sharing and communicating information is a crucial success factor, and joint activities are essential to promote exchange and collaboration and foster new ideas to enhance the uptake of environment and health issues and co-benefits in different sectors and provide valuable support in tackling the future challenges for better health and well-being.

#### Join us!

- Become a member: signature of the MoU, contribution on a voluntary basis
- Register for the ERA-ENVHEALTH newsflash: with regular up-to-date information on E&H activities
- Participate in our annual conferences and help build up this innovative discussion forum

The structure of the network is based on “contributing and sharing” and involves no centralised budget; each organisation participates on a voluntary basis.

#### Members and contacts

Do not hesitate to get in touch with us, either through your national contact point and member of the network.

Or by contacting:

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\* European Research Area Environment and Health (former FP7 project)

Acronym	Name	Country	Logo
ANSES	French agency for food, environmental and occupational health & safety	France	
Centre Léon Bérard	University Lyon 1	France	
CNR	Italian National Research Council	Italy	
EPA	Environmental Protection Agency	Ireland	
FPS HFCSE	Federal Public Service Health, Food Chain Safety and Environment	Belgium	
Folkhälsomyndigheten	Public Health Agency of Sweden	Sweden	
RIVM	National Institute for Public Health and the Environment	Netherlands	
Swedish EPA	Swedish Environmental Protection Agency	Sweden	
UA	University of Aveiro	Portugal	
UBA	German Environment Agency	Germany	
UoWM	University of Western Macedonia	Greece	

<https://www.anses.fr/en/content/era-envhealth-network>