



Health Environment

*The
new
measures*

3rd NATIONAL PLAN 2015 > 2019



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Introduction

The third National Plan for Health and the Environment (NPHE) aims to establish a government road map to reduce the impact on our health of deterioration in our environment. It makes it possible to continue and build on the actions initiated by the previous two NPHEs in the field of environmental health.

According to the definition offered by the European bureau of the World Health Organisation (WHO) in 1994 during the Helsinki conference, "environmental health comprises those aspects of human health, including quality of life, that are determined by the physical, chemical, biological, social, and psychosocial factors in the environment. It also refers to the theory and practice of assessing, correcting, controlling and preventing those factors in the environment that can potentially affect adversely the health of present and future generations."

The impact of the deterioration in the environment on human health is one of the major public health concerns, and at the same time a central ecological topic, and the WHO slogan "Today's environment, tomorrow's health", which seems to be stating the obvious, in fact turns out to be complex.

It was following the inter-ministerial conferences in London in 1999, and then in Budapest in 2004, organised by the WHO, and in keeping with the European Commission's environment and health strategy (SCALE), that the first National Plan for Health and the Environment (NPHE1) 2004-2008 was adopted; it was based on the report of a steering committee and was built on an integrated and comprehensive approach to all pollutants and living environments to address the challenges of preventing the major environmental health risks. The magnitude and complexity of the topic relating to the links between health and the environment, as well as the expectations and questions it raises from our fellow citizens, are such that the development of an NPHE, its translation to the regions and its update every five years have been included in the public health code. Finally, the 2004 Environmental Charter indicates in Article 1 that "everyone has the right to live in a balanced environment which shows due respect for health".

The second NPHE adopted in June 2009, the result of wide consultation, was based on the conclusions of a working group made up of elected officials, representatives of associations, employees and companies, as well as experts and the State. It was based on two main themes: the reduction of exposures responsible for pathologies with a high impact on health and the reduction of environmental inequalities, in keeping with other plans (Cancer plan, Health at work plan, National health and nutrition plan). Most of its objectives were reflected in the Parma Declaration in March 2010, which was adopted, 6 years after that of Budapest, by the health and environment ministers of the 53 countries in the European region of the WHO. **In September 2011, the General Assembly of the United Nations in New York adopted by consensus a resolution on the prevention and control of non-communicable diseases.**

Now, the third plan is being built to cover the period 2015-2019. Coming after 10 years of actions designed to prevent health risks linked to the environment, it should allow for

consolidation of the progress already made but also to offer a new approach to environmental health, stronger, more positive and more deeply rooted in the territories, but at the same time including the development of new scientific concepts and more particularly that of the **exposome**. This is why the concept of the “exposome”, which has emerged recently to define these complex exposures that better reflect reality, has been included in Chapter II of NPHE3.

It implies a **paradigm shift** and taking account of all the sources of pollution or exposure likely to contribute to deterioration in the health of individuals, by both considering all the exposure routes to a pollutant or harmful substance and, when possible, the interactions between pollutants. The novel feature of the exposome concept is to apply to damage of target organs by integrating the associated toxicity mechanisms and the overall biological response. It forms a link between an environmental approach and a pathological approach.

Based on the knowledge gained, human health can be considered to depend on two main components: the genome and the exposome. There is, of course, a relationship between the two. Much effort has been devoted to the genome, with real success. Nevertheless, the aetiologies of many pathologies are still not known. It is now time to devote even greater efforts to the role of the exposome.

The challenge is to tackle particularly complex health and environmental problems, in particular because of the multitude of parameters to be taken into account. Whether the risks are proven or suspected, it is our responsibility, to ensure the future of coming generations, to implement preventive or precautionary measures aimed at reducing the sources of harmful substances and reducing the exposure of populations.

Meeting this challenge requires mobilising all public authority in every area of policy (energy, development, urban planning, transport, industry, research, agriculture, etc.). Implementing NPHE3 will require action on different levers, in particular collective prevention (including pollution reduction) and individual prevention (including the issue of information, among others). Among the different policies concerned, a major effort in the field of research is necessary to improve our understanding of the impact of the environment, in its broadest sense, on human health. This action is essential to assess the fraction attributable to environmental factors for certain pathologies. Although the health data is sufficiently disturbing for there to be real political and citizen awareness of environmental health risks, the latter are sometimes difficult to demonstrate for several reasons:

- **Environmental factors are co-factors that can influence the state of health.** In the present state of our knowledge, there is not usually any specificity to the effects linked to the environment, and what is observed could have several causes;
- **We are exposed to a multitude of substances, some of them poorly understood,** and their combined effects are difficult to comprehend scientifically;
- **The effect on health often occurs in the long term,** and there is a gap between risk exposure and the onset of a pathology;
- The duration and window of exposure (pregnancy, childhood, etc.) are **parameters that can strongly condition the occurrence of pathologies;**

- **There is a difference in individual sensitivity**, particularly for genetic reasons. The issue of intergenerational transmission also arises for some substances.

For all these reasons, the question of the attributable fraction of a pathology to a risk factor is often controversial. It may even happen that the causal link itself is disputed. In these latter cases, uncertainty should not lead to inaction.

NPHE3 is not an autonomous plan but is **at the crossroads of public policies on health and the environment**. It interacts with several existing public policies aimed at reducing environmental risk factors, in particular those relating to emissions of pollutants into the air (PREPA) and into water (micropollutant plan), the management of polluted soils, exposure to noise, to radon (radon plan), but also with other factors such as pathologies (cancer plan), work (health at work plan) or diet (national health and nutrition programme). Contrary to preceding editions, the third NPHE includes several actions linked **to quality of the diet**.

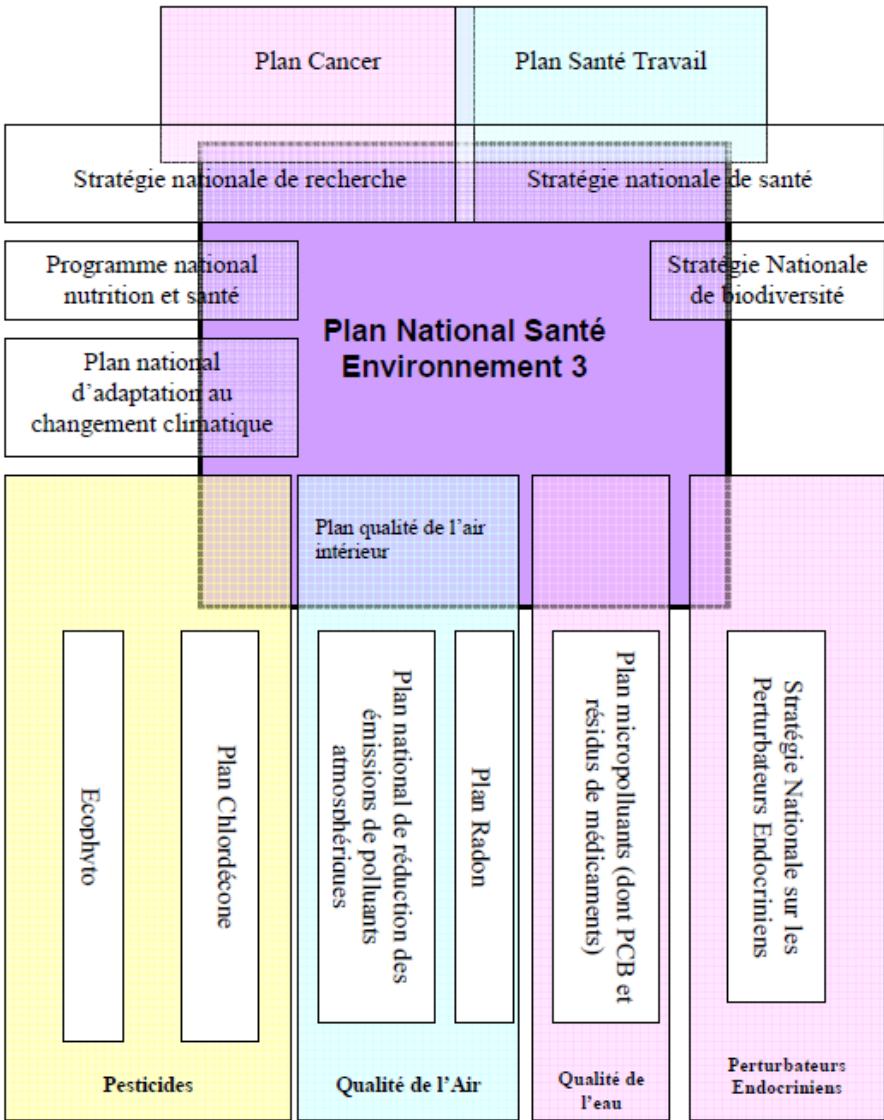
This plan has been drawn up in concert with the other structuring approaches in the field of environmental health, in particular:

- **The national health strategy;**
- **The national research strategy;**
- **The national strategy for biodiversity and associated programmes** (nature in the city plan, wetland plan, etc.);
- **The Ecophyto plan, micropollutants plan** (2010-2013 and the future), **cancer plan 3** (2014-2018), **the future health at work plan 3** (2015-2019), **national strategy on endocrine disrupters, indoor air quality plan, national plan for reduction of emissions of atmospheric pollutants, national health and nutrition programme;**
- **The third chlordecone plan;**
- **The national plan for adapting to climate change**, indeed the question of climate change and its health impacts is an important issue that must now be taken into account.

This third NPHE reflects the government's desire to reduce as much and as effectively as possible the impacts of environmental factors on health, so that everyone can live in an environment that is conducive to health. It is structured around four main categories of issues:

- **Health issues posed by pathologies linked to the environment;**
- **Issues of knowledge of exposures and levers of action;**
- **Research issues in health and the environment;**
- **Issues for territorial actions, information, communication and training.**

Le PNSE 3 et ses interfaces avec les autres plans et stratégies (2015)



1. Respond to health issues posed by pathologies linked to the environment

Purpose of this first part:
Some environmental factors lead to or contribute to the occurrence of pathologies that represent major health issues. This first part aims to identify these pathologies, to identify the environmental factors that could be associated with them, to set up actions for monitoring or understanding these pathologies and to implement preventive measures for the most specific environmental factors.

The other environmental factors identified, the exposure issues arising from them as well as the multi-factorial problems that may appear will feed into the knowledge and action issues that will be developed in the second part.

1.1. Better understanding and prevention of cancers in relations to environmental exposures

Among the pathologies associated with environmental factors, the risks of cancer must be particularly taken into account because of the serious nature of this pathology. The aetiology of many cancers, which are among the major causes of mortality and morbidity in France, is still little known today. The International Agency for Research on Cancer (IARC) considers that environmental factors in the broad sense, including smoking, alcoholism, overweight and obesity, physical activity, exposures to various physico-chemical agents and biological agents (viruses) via the diet, skin and respiratory routes are involved in a very large number of cancers. In the general or occupational environment, the population is exposed to multiple chemical or physical agents, over long periods and at low doses. Some are classified by the IARC as known carcinogens: ionizing radiation (radon, emissions and waste from nuclear installations), UV, residual asbestos in buildings prior to 1997, benzene (industries, petrol stations, etc.), air pollution (classified as definitely carcinogenic by the IARC in 2013), formaldehyde (present in various consumer products such as household cleaning products, glues), arsenical insecticides (ingestion, inhalation), or certain chemicals now withdrawn from sale but which persist in the environment, dioxins (emissions from incinerators in the 1990s) and PCBs, which notably contaminated many watercourses in France. Others are probable or suspected carcinogens, such as endocrine disrupters or electromagnetic waves.

The development of observation and monitoring as well as improvement in the knowledge of cancers linked to environmental exposures in the general population are the subject of measures in the third cancer plan, in particular in objective 12 which is to "Prevent cancers linked to work or the environment". Prevention and follow-up of occupational exposures to carcinogens are the subject of measures in the second health at work plan and their continuation or evolution will be addressed in the framework of the future third health at work plan.

In addition to these actions, NPHE3 aims to reduce the exposure of the population to environmental risk factors and targets asbestos and radon for which the health risks are known.

1.1.1 Reduce cancers linked to asbestos

Asbestos is a proven carcinogen for humans (classified in group 1 by the IARC, for lungs, pleura (mesothelioma), larynx and ovaries).

From the 1960s to the 1990s, asbestos was used intensively in the construction sector because of its heat resistance, thermal and sound insulation properties, combined with good mechanical performance and low cost. Forbidden in France since 1997 and in Europe since 2005, asbestos remains present in many buildings.

In terms of surveillance, a national monitoring program for mesotheliomas has been in place since 1998 and a mandatory reporting system for mesotheliomas, implemented by the Institute for Public Health Surveillance (InVS), has been established (measures in the 2009-2013 cancer plan).

The second health at work plan (2010-2014) focused on the prevention of "CMR" risk, and the continuation of these actions will be suggested to the social partners in the context of preparing the next health at work plan (PST3).

Action No. 1: develop and implement an inter-ministerial road map for asbestos

The results of actions carried out within the framework of NPHE2, in particular on the threshold for triggering asbestos removal or containment work under the public health code, will be extended in an inter-ministerial road map.

Given that the issues cut across several regulations, the ministries responsible for housing, ecology, health and work are committed to an inter-ministerial approach formalised by a road map of the actions envisaged on the subject. In particular, this will include actions to improve the mapping of buildings containing asbestos, development and distribution of good practice guidelines, professionalisation and increased competence for all actors involved in the asbestos sector and information for tenants on the presence of asbestos materials in their rented accommodation.

Leaders: DHUP, DGS, DGT, DGPR

Partner: GTNAF

Means of action indicator: publication and implementation of the road map

Action No. 2: continue and utilise the mapping of asbestos-containing areas in at-risk zones, so as to reduce exposures linked to natural asbestos outcrops

Although actions to prevent asbestos-related risks in buildings and in the workplace, have been implemented since the 1990s, account should also be taken of the environmental exposures associated with either asbestos outcrops or the existence of sites that are

contaminated due to former industrial activity. Taking account of these exposures, initiated in NPHE2, should be continued.

Leader: DGPR

Partners: BRGM, INERIS

Means of action indicator: publication of the maps of asbestos-containing areas in at-risk zones

Action No. 3: evaluate and manage the risk associated with exposures to fibres of asbestos varieties not used industrially (e.g. actinolite fibres) and assess the health risk associated with cleavage fragments

Local authorities and government departments are notified of the possible presence of actinolite asbestos fibres in asphalt for roads as well as "cleavage fragments". These are not asbestos fibres deliberately added to the asphalt mixes for their resistance properties, as was the case between 1970 and 1995, but naturally asbestos-containing aggregates extracted from quarries in recent decades. Questions remain about the health risk associated with exposure to cleavage fragments derived from mineral fibres of non-asbestiform actinolite and tremolite. The subject was brought before Anses - the Agency for Food, Environmental and Occupational Health & Safety - at the end of 2014.

Leaders: DGPR, DGS, DGT

Partners: Anses, BRGM, DGCCRF

Action performance indicator: publication of the Anses opinion

1.1.2 Take better account of the radon risk in buildings

Radon is a **natural radioactive gas**, present everywhere on the surface of the planet, coming mainly from granitic and volcanic sub-soils. In consequence, it is more strongly present in certain French regions (Brittany, Limousin, Massif Central, Vosges, Alps, Pyrenees, Corsica, etc.).

Radon is recognised as definitely carcinogenic for humans by the IARC. It is the **second risk factor for lung cancer** with between 1200 and 3000 deaths per year in France (2006 estimate). However, these estimates should be revised upwards after new international studies.

Radon risk management is a long-term issue, since radon is **produced indefinitely by degradation of uranium present in soils**. It will also be present in water and in certain building materials. Radon presents a **natural environmental hazard linked to its radioactive character** giving rise to solid particles that are themselves radioactive.

Radon will accumulate in closed spaces, such as buildings. Thus, **it is the leading cause of exposure to ionizing radiation for the French population**. However, it is **possible to reduce exposure** to radon by limiting its entry into the building through the tightest possible seal of the ground / building interface and by diluting it in indoor air through a satisfactory air change rate. For this, it is essential to take account of the technical characteristics of the building.

The work carried out by the IRSN in the framework of the radon action plans (NPHE1 and NPHE2) makes it possible to have a map of the hazards of radon exhalation from soils into the environment. However, the only way to know the exposure level in a house is to **measure the radon over the long term (more than 2 months) in the most frequently occupied rooms such as the bedroom and living room**. Measurement must follow certain rules in order to be representative of an average annual level, to allow comparison with the action level at which risk reduction becomes necessary. To comply with the 2013/59/Euratom directive, French regulations are being changed in this area to introduce a reference level of 300 Bq.m⁻³ for all buildings. The long-term objective is, nevertheless, **to reduce its concentration to the lowest possible level**.

Action No. 4: implement and continue the national action plan for the management of risks linked to radon

A radon action plan was imposed by the 2013/59/Euratom Directive, but France already had one since 2005 with NPHE1. It implements a set of actions to strengthen the national radon risk management policy. This plan should be renewed in 2015 for a period of 5 years.

Leader: ASN

Partners: DGS, DGT, DGPR, DHUP, IRSN, CSTB, InVS, BRGM

Action performance indicator: number of actions having given usable results for radon risk management compared with the number of actions proposed

Action No. 5: promote and support territorial actions for the integrated management of radon risk in housing

In the territory, local authorities, associations and other entities should be encouraged and supported in their actions for integrated management of the radon risk among the populations concerned. These integrated actions, targeted at housing, must include the two main stages of radon risk management: the risk information and exposure measurement stage and then, when necessary, the diagnostic stage and effective reduction of exposure. The support must take into account raising awareness or providing training for building professionals in the technical solutions to reduce radon exposure. It must also be able to offer financial aid for work to achieve even minimal reductions in radon exposure, in order to encourage owners to carry out these remedial measures. Finally, it is necessary to capitalise on the experiences gained in terms of awareness, effectiveness of the protection solutions

implemented and costs in order to be able to use this feedback for future management actions or policies.

Leaders: DGS, DHUP, ARS, DREAL

Partners: ASN, IRSN, CSTB, FFB, CAPEB, ANAH

Means of action indicators: number of actions performed in integrated management of the radon risk thanks to NPHE or PRSE support; number of houses that have been able to reduce exposure through these actions

Action No. 6: promote and support preventive actions on the radon risk in synergy with actions on indoor air quality or energy efficiency

Radon with its radioactive progeny is one of the major pollutants of indoor air quality. It is therefore desirable, where possible, to integrate it with actions linked to indoor air quality in coordination with action R of the indoor air quality plan (IAQ plan). Conversely, it is necessary to integrate IAQ into radon actions, in particular due to the need for a satisfactory air change rate. Similarly, it is necessary, whenever possible, to take radon into account in actions to improve the energy efficiency of buildings, in particular during thermal renovation work. It is preferable to carry out work that helps with both problems, such as the need for tight sealing of the ground / building interface. Actions may be planned as part of the housing energy renovation programme (PREH).

Some training courses for building professionals should include the possible interfaces and synergies between these themes.

Leaders: DGPR, DHUP

Partners: DGEC, CSTB, CAPEB, FFB, OQAI, DGS, ASN, IRSN

Action performance indicator: number of actions with synergies (bridges) between radon risk management and improvement of IAQ and / or energy efficiency

Action No. 7: update the radon health impact study taking into account the latest available measures and knowledge in order to assess the effectiveness of public policies on radon risk management and to contribute to their improvement

The results of the studies carried out will make it possible to better understand the exposure of the population according to different criteria (geographical area, type of building, exposure levels, lifestyle, etc.) and thus adapt management actions (information, regulations, incentives, etc.) in order to increase their effectiveness and ultimately to reduce radon exposure in housing effectively and sustainably.

Leaders: InVS, IRSN

Partners: DGS, DGPR, DHUP, ASN, CSTB

Action performance indicator: publication of the updated health impact study

1.2. Prevent health risks linked to exposure to certain plant or animal species

Allergic diseases (respiratory, skin or digestive) related to the air or food environment are a real public health issue. They concern 25 to 30% of the French population and have a strong socio-economic impact (cost, absenteeism, quality of life). In its 2014 report on the health impact of exposure of the general population to pollens, Anses indicates that in epidemiological surveys carried out in France from 1994 to 2006, the prevalence of allergic rhinitis is estimated at most at 7% in children aged 6-7 years, 20% in children aged 9 to 11 years (with sensitisation of nearly 27% of children with at least one aeroallergen), 18% in adolescents aged 13 to 14, 31 to 34% in adults.

The increasing prevalence of these diseases is linked to a major change in our allergenic environment. Anses, in the above-mentioned 2014 report, indicates in particular that certain chemical pollutants may modulate the allergic reaction by acting directly on sensitised people or by acting on the pollen grains, in particular on their walls and their protein content. In France, there are organisations for monitoring outdoor air allergens and informing the public and health professionals about the level of pollination or outdoor air pollution, such as the national aerobiological monitoring network (RNSA), studying pollen and outdoor air mould levels, the French association of sentinel pollinaria (APSF), which monitors the start and end dates for emissions of major pollens from a geographical area, approved associations for surveillance of outdoor air quality (AASQA), in particular regulated pollutants, in addition to health surveillance (carried out by InVS, health professionals and allergy specialists in particular).

In its 2014 pollen survey, Anses particularly recommended strengthening and sustaining a pollen monitoring system, to inform the population and health professionals about atmospheric concentrations of pollen, allowing medication to be taken pre-emptively or an activity to be put off. In addition, Anses recommended the standardisation of methods for measuring pollen grains in the air, the gradual addition of automated measurements to the manually read sensor system, the development of tools for predictive modelling of emissions and dispersion of pollen grains, the development of measurements of allergens in the air, prioritising the pollens to be monitored, and informing local authorities and individuals about the risks associated with allergenic pollens.

The purpose of the following actions is to apply the Anses recommendations, in particular with regard to pollen monitoring, and to sustain the missions of the RNSA.

Action No. 8: strengthen monitoring, forecasting and information on concentrations of pollen and mould allergens in outdoor air

The RNSA is a non-profit association, created in 1996, currently financed partly by the health ministry (30%), by the ministry in charge of ecology directly or via ADEME (30%), by ARSs

(10%) and by local authorities (5%). The main tasks of this network are the study of air content in pollens and moulds, the collection of associated clinical data, and information for the population and the various professionals concerned, including health professionals, in order to improve the efficiency of medical care and help in the management of species with allergenic pollens. The current operation of the RNSA will be evaluated and a new organisation proposed to ensure monitoring and information objectives by involving the various partners concerned.

Leaders: DGEC, DGS

Partners: RNSA, the French association of sentinel pollinaria, LCSQA, AASQA, Anses, health professionals

Means of action indicators: establishment of a strengthened organisation for the monitoring of biological particles (in metropolitan France and overseas), number of information bulletins on the risk of allergies published each year, development of the sentinel pollinaria network

Action No. 9: carry out work to rank pollens, monitor the development of new plant species whose pollen could prove harmful to health, develop recommendations to limit their spread

This is to respond to one of the recommendations of the Anses opinion "state of knowledge on the health impact of exposure of the general population to pollens present in ambient air" published in January 2014.

Leaders: DGS, DEB

Partners: Anses, RNSA, AASQA, LCSQA, DGEC

Means of action indicator: number of sensors for performing air pollen surveillance in mainland France

Action No. 10: encourage local authorities to reduce the presence and development of plants that emit allergenic pollens and encourage the distribution of information on the allergic and / or toxic risk when selling the plants concerned

On the one hand, this is to reduce the risk at source, but also to encourage the training of staff in charge of the management of green spaces in order to eradicate the plants at risk before pollen is spread.

Leaders: DGS, DGAL

Partners: DGALN, Anses, ARS, RNSA, AASQA, DGEC, DGCCRF, LCSQA, InVS, INRA, local authorities, professionals in management of green spaces and the production, sale and distribution of plants

Means of action indicators: number of ARSs that include an action in their PRSE; number of informative leaflets distributed

Action No. 11: better assess exposure to ragweed and monitor its geographic expansion

Ragweed, an invasive species with highly allergenic pollen, is continuing to expand in the territory, resulting in a constant increase in the number of allergic people. The Rhône-Alpes regional health agency estimated that in 2013, nearly 200 000 people received care related to ragweed allergy in Rhône-Alpes, which corresponds to health costs of about 15 million Euros. The fight against ragweeds is coordinated by the ragweed observatory.

Leaders: DGS, DGAL

Partners: INRA, Anses, RNSA, ARS, prefectures, AASQA, DGEC, FCBN-CBN, local authorities, transport managers, agricultural professionals, environmental associations, associations for protection of the sick, health insurance

Means of action indicators: regular publication of maps; development of the ragweed community referral network

Action No. 12: improve the management of health risks involving wild fauna and flora

Wild fauna plays a part in the epidemiology of certain human diseases. Convergence of information indicates that the incidence of these diseases is expected to increase as a result of global changes. Wild animals are not managed in the way that livestock is, which raises specific risk management issues in relation to the different interests involved, the economics of livestock production, the protection of biodiversity and public health. **While public health protection is a priority, the status of wild animals and their roles in ecosystems means that close attention must be paid to the actions to be undertaken and their consequences.** The assessment of health risks, and above all their management, requires a pluralistic approach involving the different scientific specialities to be mobilised and the various stakeholders. Feedback from recent crises (avian influenza, tuberculosis of elephants, badgers, brucellosis of ibex, etc.) shows the difficulty of such an approach. Its analysis will enable a better understanding of the points of view, in order, ultimately, to improve the management of health risks involving wild animals. **The NPHE seeks to build a sustainable dialogue between citizens, epidemiologists and risk managers.** In addition, there is a **need to strengthen and coordinate the management of plant and animal species whose**

proliferation can be detrimental to public health, such as the pine processionary, giant hogweed, yellowtail moth, and physalia.

The action aims to facilitate dialogue between stakeholders, to bring together and maintain the conditions for pluralistic management of these risks, to improve the efficiency of the management of these risks, to use the services provided by nature in relation to the spread of diseases.

Leaders: DGAL, DEB, DGS

Partners: Anses, INRA, ONCFS, INVS, CSPNB, CGDD-DRI

Action performance indicator: responses on the pluralistic management of health risks involving wild animals in practice (documents in the form of reports, theses or books)

1.3. Better take into account the role of environmental exposures in the increase in certain diseases (metabolic diseases, reproductive diseases, obesity, etc.)

1.3.1 Implement a national strategy on endocrine disruptors

It is now widely accepted that **many chemicals can alter the functioning of the hormone system** and are therefore suspected of having **adverse effects on human health, animal health and the environment**. Although there is a consensus on the definition of endocrine disruptors proposed by WHO (2002), this is not the case for regulatory criteria, which are the subject of much controversy among risk managers and stakeholders. The periods of in utero and postnatal development and those surrounding puberty constitute particular windows of sensitivity to the effects of these substances. **Better characterising exposures and possible risks to sensitive populations during these periods is a public health issue**, in order to prevent the potential effects of these substances on health. With the aim of better structuring the efforts of the scientific community on these issues, **France was the first country in Europe to adopt a national strategy on the subject, announced by the Minister responsible for Ecology on 29 April 2014**.

This strategy is based around the following themes: **sustaining support for endocrine disruptor research, continuing population and environmental monitoring, implementing an expertise programme on the substances, taking endocrine disruptors into account in regulations, particularly at European level, and informing the public, especially vulnerable people**.

Primary objective of the National Strategy on Endocrine Disruptors (SNPE):

Reduce the exposure of the population and the environment to endocrine disruptors

The SNPE also provides support for industrial innovation and the establishment of public-private partnerships to encourage the replacement of these harmful substances. The replacement of substances considered to be endocrine disruptors will reduce the exposure of

the population and the environment. However, **the substances, materials and processes that will be used to substitute for prohibited products must be assessed by manufacturers** to demonstrate that they do not present an uncontrolled risk to health and the environment, including with regard to endocrine disruption. In addition, their technological and economic viability should be analysed. The notion of benefit-risk cannot be ignored; without being sufficient in itself to rule out any substitution, it must be taken into account on a case-by-case basis.

Action No. 13: acquire the means of identifying the endocrine disrupting character of chemical substances

Leaders: DGPR, DGS

Partners: INERIS, MEDEF, CGDD-DRI, DGS

Action performance indicators: feasibility study of a public-private platform for the pre-validation of test methods for substances; operational capability of the platform

Action No. 14: evaluate in a more precise and targeted manner the danger and exposure of populations and the environment to certain endocrine disrupters, in order to better manage them

Leaders: DGS, DGPR

Partners: Anses, ANSM, INERIS

Action performance indicator: expert assessment of at least 5 substances per year by Anses and 3 substances per year by ANSM.

1.3.2 Understand and act on all environmental factors involved in metabolic diseases and obesity

The effects of sedentary lifestyles, physical inactivity and excessive food intake have led to a continuing rise in pathologies linked to poor nutrition, such as **obesity, type 2 diabetes, cardiovascular disease, osteoporosis, eating disorders and certain cancers**. These pathologies are the **main causes of death in France and weigh very heavily on health insurance expenditure**. The national health and nutrition programme has set precise and quantified objectives, in terms of both food consumption and physical activity. Diet is a major determinant of health. Nutritional imbalances play a major role in causing the most frequent chronic diseases and are responsible for the vast majority of deaths in France and other European countries.

Obesity and metabolic diseases are the perfect example of situations resulting from interactions between biological, behavioural and environmental determinants. Beyond individual behaviour (eating behaviour, physical inactivity), **the role of the environment seems to be major: lifestyles in the broad sense, transport, social trajectories,**

contaminants, economic offers and trade-offs, etc. In France, in 2007, more than 2.5 million people were treated for diabetes, 17% of the population suffered from obesity and more than 500 000 people had life-threatening severe obesity. The annual cost of these pathologies is extremely high: 12.5 billion for diabetes, 13.5 billion for cancer, 5.3 billion for cerebrovascular care alone, 4 billion for obesity.

Moreover, the progressive nature of these chronic diseases requires that the time dimension is taken into account, with early events being of particular interest.

Preventive and therapeutic strategies, long based on health messages, have reached their limits (e.g. the social and territorial gradient is not reduced), in particular because of an **environmental pressure favouring persistent obesity. Individual recommendations should be complemented by community-based strategies on the environment.**

Action No. 15: in the scope of analysing the role of environmental factors in the development of metabolic diseases and their contribution to social and territorial gradients, to obtain data on the prevalence of these diseases according to gender and environment and to integrate methods of collecting environmental data

The action aims to enrich the biomedical model of obesity and metabolic diseases by adding environmental and social dimensions. The challenge is considerable for prevention, which currently lacks scientific data to adapt its methods and its strategy in the face of worsening territorial and social gradients.

Leader: DGS

Partners: CNAM, INPES, Anses, INVS, HAS, ARS

Action performance indicator: existence of data on obesity and metabolic diseases according to gender, age, physical activities, territories, etc.

Action No. 16: define public health messages in the field of nutrition taking into account all environmental risk factors and contribute to the consistency of public health recommendations, taking into account environmental risk factors

The assessment of public health shows major social and territorial gradients, an increasing prevalence of severe forms of obesity among women and populations in social difficulties, and a considerable medico-economic impact from long-term illnesses linked to obesity (diabetes, cardiovascular diseases, cancers, etc.). The situation in French overseas departments is particularly serious.

Leader: DGS

Partners: CNAM, INPES, Anses, INVS, HAS, ARS

Action performance indicator: number of public health messages

1.3.3 Prevent reprotoxic risks from environmental exposures and better understand them

Human reproductive disorders are very diverse and the concept of reproductive health is gradually becoming established, to account for the diversity of these disorders. While reproductive health includes fertility issues, according to the WHO it also more broadly covers reproductive processes, functions and systems at all stages of life. In particular, this includes pathologies of the reproductive organs such as cancers, urogenital malformations, biological characteristics (reproductive hormones and gametes) and transgenerational reproductive effects.

Some chemical and physical agents represent proven threats to reproductive health and development, in particular compounds identified as mutagenic and / or reprotoxic (CMRs). Other agents are more or less strongly suspected of having effects on reproductive health and development; they act in particular by disrupting the endocrine system.

In the workplace, actions relating to CMRs (substitution, checks) were brought about by PST2. Their evolution or continuation will be addressed in the development of PST3.

In addition to the actions developed in the **national strategy on endocrine disruptors (SNPE)**, the aim here is to prevent the health impacts of environmental factors on reproductive health and development specifically, in the short, medium and long term:

- **By improving knowledge of exposures to environmental factors presenting a proven risk to reproduction, fertility or development;**
- **By improving knowledge and monitoring of the reproductive state of health of the French population;**
- **By improving knowledge of the links between environmental factors and fertility, reproduction and development.**

Action No. 17: continue assessing actual exposures, the risk resulting from exposures and data on reprotoxic dangers available for target populations (men and women of childbearing age and young children) in the general and working population

Leaders: DGS, MAAF-SG, DGT, DGPR

Partners: InVS, Anses, INERIS, INSERM and UVSQ (Reproductive Research Group (GDR))

Action performance indicators: number of reprotoxic and / or endocrine disrupter substances subject to expert assessment in ERS, number of substances registered under the REACH regulation

Action No. 18: continue monitoring the reproductive state of health of the French population

Leader: DGS

Partners: InVS, Anses, INSERM and UVSQ (link between environmental factors and reproductive disorders), Reproductive Research Group (GDR)

Action performance indicator: publication of fertility and perinatal indicators

1.3.4 Prevent neurotoxic risks and neurobehavioural development deficits related to environmental pollutants and better understand them

Among the diseases of the nervous system, **neurodegenerative diseases (NDDs) represent a major cause of dependence in the elderly.** Given the ageing population and the lack of curative treatment, the burden of NDDs will inevitably increase in the years to come. **These pathologies lead to a reduction in life expectancy and quality of life, and increase the risk of dependence, institutionalisation and complications that often lead to hospitalisation,** with the consequent important burden for caregivers and in terms of health costs.

Aetiologically, these are **multifactorial diseases for which the role of the environment has been evoked.** The role of occupational exposure to pesticides is recognised for Parkinson's disease, recognised as an occupational disease among farmers since 2012, but there are uncertainties about the type of product families most closely associated with the disease. The collective expertise of Inserm, "Pesticides and Health" has also identified Alzheimer's disease and Amyotrophic Lateral Sclerosis (ALS) as two pathologies for which the available studies are in favour of a link, but the scientific arguments are less robust and further studies are needed. Other exposures, such as exposure to metals, have been suggested for Parkinson's disease and ALS. More recent studies focus on the role of air pollution in cognitive decline.

However, there is no monitoring mechanism to give an accurate estimate of the frequency of these pathologies and their evolution.

Action No. 19: establishment of a mechanism for estimating the frequency (incidence, prevalence) of NDDs from medico-administrative databases, their geographical distribution and their relation to exposures of interest

Neurodevelopmental disorders in children may also have an environmental origin, following the exposure of the foetus or child from birth, to suspected neurotoxic chemicals such as

polychlorinated biphenyls (PCBs) or lead and methylmercury, proven to be neurotoxic and frequently found in the environment. The nervous system is very sensitive to the action of certain toxic substances during its development and the resulting effects are irreversible.

Leader: DGS, MAAF-SG

Partners: InVS, INSERM

Action performance indicator: publication of data on frequency of NDDs

1.3.5 Prevent the risks linked to exposure to heavy metals (lead, mercury and cadmium)

Mercury can have toxic effects on the nervous, digestive and immune systems, and on the lungs, kidneys, skin and eyes in particular; it is likely to have detrimental effects on the developing brain and nervous system in children. The main health effect of methylmercury is the development of neurodevelopmental disorders. It is considered by the WHO as one of ten chemical products or groups of chemical products that are of extreme concern for public health.

Exposure to mercury, even in small quantities, can cause serious health problems and constitutes a threat to the development of the infant in utero and at an early age.

Among the actions already undertaken, and in addition to the actions already carried out within the framework of NPHE2: the case of French Guyana.

A food consumption study should be conducted from 2015 in French Guyana to estimate the consumption of the most contaminated species in the areas.

The fight against mercury pollution is being organised at international level through the Minamata Convention, which is to be ratified by France in the near future. In French Guyana, environmental contamination with mercury comes from the geochemical background, as well as from past and present gold-mining activities, although the use of mercury has been prohibited since 2006 for gold mining. Consumption of fish is recognised as the main source of contamination of populations.

Action No. 20: evaluate the benefits of extending mercury testing, currently practised for pregnant women in certain at-risk areas, to all women of childbearing age or even children under 7 years in all at-risk areas

In order to prevent the risks associated with mercury in unborn or breast-fed children, a prevention programme was started on Haut Maroni in 2012; **dietary advice is provided to all pregnant and lactating women and analyses of capillary mercury levels are performed in early pregnancy and at delivery.**

The extension of this screening to all women of childbearing age or even children under 7 in all risk areas is envisaged, but its benefit must be assessed beforehand.

Leaders:

DGS

Partners: InVS, HCSP

Action performance indicator: publication of the conclusions of the evaluation

Action No. 21: develop good practice recommendations for the treatment of people with high mercury levels

The discovery of high levels of mercury in pregnant women may require medical care for both mother and child.

Leader: DGS

Partners: Society of clinical toxicology (STC), HAS

Means of action indicator: submission to the STC

Action performance indicator: publication of the recommendations by the end of 2015

Action No. 22: launch an action plan on lead to lower blood lead levels (continuation of primary prevention actions, definition of individual actions, continuation of efforts to detect lead poisoning in children and pregnant women)

Lead poisoning in children is a public health concern that emerged in 1984, with the discovery by hospitals in Paris of serious poisonings requiring emergency hospital care. A screening activity based on the determination of blood lead levels in children at risk was introduced, first in Paris, and then gradually expanded throughout the country in the 1990s. The actions implemented, including the removal of leaded petrol (1 January 2000) and the treatment or demolition of old unhealthy buildings have led to a reduction in the number of cases of lead poisoning (defined as a blood lead of more than 100 µg/L) discovered following screening.

Despite a very large decrease in lead intake by young children in the general population, lead intake in children remains a public health concern given the established existence of the harmful effects (some of which have no known toxic threshold) of lead below 100 µg/L, the current management threshold.

In June 2014, the HCSP published a report on the identification of new targets for the management of lead exposures, advocating a policy aimed both at reducing exposures of all

children to the lowest possible level and identifying specific management resources for those most exposed.

Leaders: DHUP, DGS

Partners: DHUP, InVS, ARS, DGPR

Action performance indicator: evolution of the surveillance data on infant lead poisoning (InVS)

Beyond lead and mercury, cadmium is another heavy metal presenting important issues. It is a ubiquitous heavy metal **that is found in the various compartments of the environment due to its natural presence in the earth's crust and to anthropogenic inputs, in particular as a result of industrial and agricultural activities** (some phosphate fertilisers). **Prolonged exposure to oral cadmium induces kidney damage, bone fragility, reproductive disorders and an increased risk of cancer**, giving rise to its classification as a "human carcinogen" (group 1) by the IARC and category 1B (carcinogenic in animals) by the European Union.

The total diet study published by Anses in 2011 (EAT2) estimated that 0.6 % of adults and 14.9 % of children exceed the tolerable weekly dose proposed by EFSA in 2009 (2.5 µg / kg bw / wk). It therefore appears necessary to reduce the dietary intake of cadmium.

Action No. 23: search for metals such as mercury, lead and cadmium in foodstuffs of animal and plant origin and in products intended for animal feed

The surveillance plans and control plans (PSPC) carried out by the DGAL and the national tasks carried out by the DGCCRF are official controls that form part of the general food safety assessment and control system. They contribute to the verification of the conformity of animal and plant foodstuffs and products intended for animal feed, in relation to the regulations in force. They participate in the collection of data for the assessment of consumer exposure to food borne hazards. They also allow for suggestion of risk management measures and the assessment of their effectiveness.

Leaders: DGAL, DGCCRF

Partners: Anses, DGS, DGPR

Action performance indicator: number of analyses carried out each year in the scope of the DGAL PSPC and the DGCCRF national tasks

Action No. 24: evaluate the relevance and feasibility of screening, monitoring of intake or health surveillance of populations exposed to metals such as mercury, lead, cadmium on the priority sites

concerned, implement them where appropriate and distribute information on prevention according to the results

Various sites contaminated by heavy metals have already been listed and require targeted actions.

Leaders: DGS, DGPR

Partners: Anses, InVs, DGAL, ARS, CIRE

Means indicator: percentage of sites for which surveillance is put in place

Performance indicator: change in the rates of metal intake for the population

1.3.6 Better understanding of hypersensitivity

Today, no one can dispute the reality of the experience of people who attribute their symptoms to exposure to environmental factors, including radio frequencies and chemicals. For example, researchers in the food toxicology unit (TOXALIM) at INRA in Toulouse demonstrated in rats that perinatal exposure (in utero and during lactation) to bisphenol A (BPA) at low doses, has implications for the development of the immune system and predisposes their offspring to food intolerance in adulthood.

Action 25: continue work on the study and care of patients with electro-hypersensitivity

Concerning hypersensitivity to electromagnetic fields, a study was put in place following the round table "radio frequencies, health, environment" organised in spring 2009 by the government. This study is funded through the Hospital Clinical Research Programme (PHRC 2010). Led by the department of occupational pathology in the Cochin hospital group, it is based on consultation centres for occupational and environmental pathology in several regions. The objective is to improve the care of patients by developing a care protocol.

It is important to finalise this study and ensure that the results are distributed to health professionals. Public authorities will also be able to take advantage of the results to carry out initiatives with regard to other types of hypersensitivity.

Leader: DGPR, DGS

Partner: Anses, AP-HP, INERIS

Action performance indicator: publication of the results of the PHRC

Action No. 26: conduct a global expert assessment of electro-hypersensitivity

In October 2013, Anses published the results of an assessment of risks linked to exposure to radio frequencies. It has relied on the widest possible review of studies published internationally since 2009. The question of electro-hypersensitivity is the subject of a specific expert assessment, which started in 2014.

Leaders: DGPR, DGS

Partner: Anses

Action performance indicator: publication of the Anses expert assessment

1.4. Take better account of the increased risks of epidemics of vector-borne diseases in a context of climate change

The overseas territories are regularly confronted with epidemics of arboviruses that are sometimes of great magnitude and the frequency of occurrence of these epidemics even seems to be accelerating, with an increasing diversity of viruses circulating: **Chikungunya in Reunion and Mayotte** (2005/2006), **Dengue in the French West Indies and Guyana** (2007, 2010, 2013), **Zika in French Polynesia and New Caledonia** (2013/2014), **Chikungunya in the French West Indies and Guyana**, etc. Some of these diseases are well known in these territories, and even if they have been the subject of sometimes dramatic epidemic episodes in the past (dengue, chikungunya, etc.), they represent an epidemic risk that is still just as important. Others however, unknown to the general public, are counted in their hundreds around the world and can also affect these territories at any time (viruses including Sindbis, Wesselsbron, Zika, West Nile, Japanese encephalitis, etc.).

As for the mainland, it is subject to the progressive invasion of its territory by the *Aedes albopictus* (tiger mosquito), one of the most effective vectors in the transmission of these viruses. The latest modelling shows that a large part of the national territory could thus be colonised if we do not act. The few contained episodes of viral circulation of dengue and chikungunya on the mainland confirm the extreme sensitivity of the territory to these different threats. The different models show, furthermore, that in the medium term, a very large part of the mainland territory will be colonised by this species. Thus, mainland and overseas territories are today increasingly marked by these risks of emergence, due in particular to the increase in the transport of goods and people, the colonisation of territories by the vectors, modification of environments, urbanisation, and climate change.

A large proportion of these emerging diseases are zoonoses (transmissible from animals to humans and vice versa). This observation now implies the necessary strengthening of the links between human health, animal health and environmental management, in a concept called "One Health".

The chikungunya epidemic of 2005-2006 in the Indian Ocean and of 2014 in the French departments of America, or the recurring epidemics of dengue in the overseas territories, have shown each time the importance of permanently maintaining an adapted and effective vector-control campaign. Thus, vector control is an essential response mechanism to be able to cope not only with the permanent risk of dengue or chikungunya, but also with many other viral threats transmitted by arthropod vectors such as mosquitoes, phlebotomine sand

flies, etc. Vector control is often mistakenly reduced to insecticidal control. However, it presents a wide range of intervention methods, including entomological surveillance, the control of breeding sites, management of the environment (in particular by preserving biodiversity which allows competition between species), development of the territory and social mobilisation. This last line of intervention is essential, because the population must be placed at the heart of the mechanism through the regular elimination of anthropogenic breeding sites and protection against mosquito bites.

But vector control is now facing increasing constraints that limit its ability to intervene: development of insecticide resistance phenomena, limitation of the number of authorised compounds, increasing attention to the unintentional effects of insecticides, changes in human behaviour, etc. The evolution of vector control strategies and techniques adapted to each territory is therefore imperative to respond to these constraints and to new threats.

Prevention and control of vector-borne diseases should be based on integrated vector control methods, including monitoring, maintaining balance between species and targeting the use of biocides in space and in time. Competent actors in different disciplines (epidemiology, entomology, biocide chemistry, genetics, prophylaxis, ecology, climatology, risk management, etc.) must necessarily be responsible for upstream coordination of the crises.

Action No. 27: develop and implement local intersectoral strategies for vector control of communicable diseases

The objective of the action is to strengthen the knowledge, surveillance and preparation of the response to the risk of introduction and development of vector-borne diseases for each territory concerned. This includes, in particular:

- providing updates on feedback on risk management in certain territories;
- conducting experiments and follow-up in areas concerned by vector control to develop integrated pest management methods compatible with both biodiversity management and conservation objectives and the requirements for the protection of human health, a priority issue. To this end, encourage the research and development of alternative control methods to biocides (sterile insect technique, *Wolbachia*), predation, landscape development and urban planning;
- monitoring the resistance of arthropod vectors and non-target fauna to the compounds used and usable for vector control as well as to alternative compounds that could be used by derogation during an epidemic in case of proven resistance of the vectors to the authorised compounds;
- developing a discussion and coordinated actions aimed at increasing public awareness, prevention and community control in an integrated management context (fight against breeding sites through waste management and water management in gardens, etc.), relying in particular on local health contracts;

- finding synergies between health monitoring and ecological monitoring networks, in order to benefit from the early detection of any new emergence (for example, monitoring networks for bird mortality and West Nile disease).

Leaders: DGS, DEB

Partners: InVS, National expert centre on vectors, DGOM, DGAL, DGRI, DGPR, CGDD-DRI

Action performance indicator: development, publication and implementation of local strategies (departments)

2. Issues in knowledge of exposures, their effects and levers of action

Purpose of this second part:
Pathologies are sometimes caused by the specific factors that have been addressed in the first part, but most often they have multifactorial causes that will be addressed in this second part. The factors cited include in particular air and water pollutants, certain chemicals (pesticides, etc.) and physical agents (noise, etc.), etc. The cumulative exposure (exposome) of the population to these different factors must therefore be understood through indicators of overall exposure and biomonitoring programmes. The purpose of this part is to construct such indicators scientifically, to ensure a level of excellence on biomonitoring that reflects the reality of the population's intake and to take concrete action on the factors recalled above.

The contribution of physico-chemical and biological, as well as socio-economic and psychosocial environmental factors to the development of acute and especially chronic diseases has increased over the past two decades. Public health actions have already been taken and others will have to be taken in the years to come, notably to improve knowledge on causal links between environment and health, to assess the health impacts of environmental factors and to control the risks (part I of this plan).

2.1. Establish the link between environmental contamination, exposure biomarkers and health data

2.1.1 Improve knowledge of exposures in the population through the use of biomonitoring data

The general population is exposed, often at low or even very low doses, to a multitude of chemical agents, by inhalation, skin contact or ingestion.

Some of these chemical agents are known to be dangerous: carcinogenic, mutagenic, reprotoxic (CMR) compounds, persistent organic compounds, PBTs, etc. and are now regulated (control, prohibition, restriction, authorisation, etc.) but persist in the environment, like dioxins for example. Others, such as certain pesticides in particular, are the subject of more or less serious suspicions about their harmful effects on human health, whether it be their role in the occurrence of cancers, neurodegenerative diseases, or their properties as endocrine disrupters.

The ubiquitous nature of exposure to chemical agents (food contaminants, multiple consumer products, environmental media, air, water, soil, etc.) makes it difficult to characterise human exposures to these substances solely on the basis of their measurement in different media. Biomonitoring studies of the general population offer the possibility of an integrated measurement of exposure (all media and all exposure routes).

The results of the 2006-2007 ENNS study carried out in the general population by InVS show the prevalence of exposures to chemical agents (dioxins, NDL-PCBs, organophosphorus or

organochlorine pesticides, pyrethroids, etc.) and levels observed in France for certain substances, including some pyrethroid or organophosphorus pesticides, are relatively high compared with other countries.

Population-based biomonitoring studies describe levels of intake and the state of health, but also, by linking biomarker assays with the collection of information on diet, life styles, the home, etc. among participants, allow identification of the main factors determining these levels of intake, and thus identifying the “levers” that could ultimately suggest measures aimed at reducing exposures. In 2008, the European conference on human biomonitoring, organised under the auspices of the French Presidency of the Council of the European Union, was held in Paris. It has provided an integrated view of the different levels of implementation of human biomonitoring activities (European, national, regional, local), with the aim of making more informed decisions.

Initially, following this conference, **the European COPHES project (Consortium to Perform Human Biomonitoring on a European Scale) and a pilot study (DEMOCOPHES)** were set up in 2009 and 2010 respectively, with the aim of developing a framework for collecting biomonitoring data across Europe, using a harmonised approach in order to achieve comparable results as far as possible. This study, in which 35 institutions from 27 European countries participated, enabled a network of institutes to draw up guides for conducting biomonitoring surveys by the different Member States.

The production of data on the intake of the general French population by chemical agents, for the purposes of surveillance and description, is also likely – provided that the necessary synergies and collaborations are put in place – to contribute:

- **To expertise with regard to associated risks**, in this population, to exposures to these agents, in particular by the construction of reference values with health significance (sometimes referred to as “internal TRVs”). These are health thresholds defined by expert consensus based on current scientific toxicological and epidemiological knowledge of the risks associated with the substances under study;
- **To research work in aetiology**, for which the availability of a reliable measure of exposure is an important factor in the accuracy and reliability of the results produced.

In addition, the repetition of biomonitoring surveys in the general population will make it possible to follow changes in intake levels over time and to assess the effectiveness of measures aimed at reducing exposures.

The opportunity will be explored to link this work with the ongoing reflection on the centralisation of workers' biomonitoring data, carried out with the aim of preventing occupational exposures and improving knowledge by InVS, Anses, INRS and the University of Grenoble in connection with the DGT.

Action No. 28: use the data produced in the scope of the national biomonitoring programme (ELFE perinatal component and ESTEBAN study)

The national biomonitoring programme developed as a follow-up to NPHE2 provides initially for the implementation by the Institute for Public Health Surveillance (InVS) of two studies aimed at monitoring intakes:

- **Surveillance of intakes by mothers and their newborn.** Based on the sample of mothers included in the Elfe cohort for which biological samples, taken in the maternity hospital, are available in sufficient quantities, this study aims to describe levels of intake by different biomarkers, including some carcinogens or potential carcinogens, and pesticides. The first results will be available as from 2014;
- **Surveillance of intakes in the general population in the scope of the ESTEBAN study (Environment, health, biomonitoring, physical activity and nutrition).** This study is a cross-sectional survey of biomonitoring coupled with health examinations and a nutritional component carried out by InVS. The biomonitoring component will allow the description and follow-up (by repetition of surveys) of population exposure levels (1000 children aged 6-17 years and 4000 adults) residing in mainland France, for about a hundred substances, including certain carcinogens or potential carcinogens and pesticides.

The use of the data will identify actions to reduce health-risk exposures for chemicals for which over-intake is observed.

Leaders: DGPR, DGS

Partners: InVS, INERIS

Action performance indicator: first results of intake by ELFE children; production of intake levels of newborns and mothers (perinatal component); production of levels of intake in the general population (6-74 years Esteban)

2.1.2 Measure pesticides in the air, documenting exposures and uses in order to carry out health risk assessments

While the term “pesticides” has long been associated with agricultural uses, it is necessary to adopt a broader definition to cover the diversity of uses of these substances, the complexity of the population's exposures and the potential health impacts. Thus, **in addition to agricultural products or products intended for the maintenance of green areas and private gardens (plant protection products: fungicides, herbicides, etc.), certain biocidal products and human and veterinary anti-parasite products should also be taken into account.**

Monitoring of pesticides in foods

There is regulatory oversight of pesticide residues in foods implemented by the Ministries of Consumer Affairs (DGCCRF) and Agriculture (DGAL). In addition, Anses regularly conducts Total Diet Studies (EAT) to determine the levels of contamination of food as consumed and, on this basis, to estimate the levels of exposure of the population to substances of interest in terms of public health and risks by ingestion. Thus, in the French total diet study (EAT2 2006-2010), 283 pesticides were investigated. The study found that children and adults had no

chronic risk for 96% of the substances evaluated and 87% of the priority substances. For these substances, exposures remain very low (between 0.03% and 61% of the TRV at the 95th percentile), even under the most protective hypothesis.

Monitoring of pesticides in water destined for human consumption

As in the case of foodstuffs, there is regulatory oversight of pesticides in water intended for human consumption, implemented by the Health Ministry as part of sanitary control. The latest state of play of the compliance of distributed water in relation to pesticides, carried out by the DGS in conjunction with the ARS, shows that in 2010, 96% of the population were supplied with water permanently compliant with quality limits. Atrazine and its metabolites are mainly responsible for the cases where the drinking water quality limit is exceeded.

Monitoring of pesticides in the air

The assessment of the pesticide content in ambient air in France has been carried out over the past ten years by the approved associations for surveillance of air quality (AASQA), on a voluntary basis and with the financial support of local and regional partners. The concentrations found in some areas of the territory have raised health questions, with the presence of pesticides in the air being clearly confirmed in rural as well as in urban areas. Exposure to pesticides is also documented nationally in various enclosed environments such as housing and schools by the Indoor Air Quality Observatory.

Unlike water and food, monitoring of pesticides in the air is not subject to special requirements. In the scope of the construction of the **exposome**, the issue of monitoring of pesticides in the air and their possible impact on health will be investigated within the framework of NPHE3.

In addition, aerial spraying of pesticides requires a better regulatory framework for the health and environmental protection of populations, natural areas and fauna and flora, especially pollinators.

Action No. 29: define a basic list of pesticides to be measured in the air, formalise a monitoring protocol for pesticides in the air and launch an exploratory campaign of pesticide measurement in outdoor air

The purpose of the action is to assess the exposure of the population to pesticides in the air. To do this, it is envisaged to proceed in several stages:

- A **harmonised protocol for the monitoring of pesticides in ambient air and the associated risk analysis** will be consolidated by the end of 2015 to take account of the Anses expert assessment (the agency was called on in 2015 to propose a prioritised list of 10 to 20 substances to be monitored and to formulate recommendations for monitoring pesticides in air);

- In 2015-2016, a national exploratory campaign will be undertaken with voluntary AASQAs.

Leaders: DGAL, DGEC, CGDD-DRI

Partners: Anses, DGS, LSCQA, ATMO France - voluntary AASQAs, Pesticides Programme, DGPR

Action performance indicators: opinion from Anses on the basic list and the sampling strategy; publication of the protocol, results of the campaign

Action No. 30: document exposures of populations living near pesticide application areas (focus on farm exposures for farmers and their families)

Leader: MAAF/SG

Partners: CGDD-DRI, Anses (APR), MSA (Phyt'attitude network), InVS, INERIS, voluntary AASQAs, Pesticides Research Programme and possibly the research programmes Primequal on air quality, PNRPE on endocrine disrupters and PNREST environmental health at work

Action performance indicators: aggregation of exposure data; conclusions of dedicated biomonitoring programmes (e.g. PHYTOTIF in Poitou-Charentes); creation of exposure indicators

Action No. 31: document the use of domestic pesticides (biocides, anti-parasite and plant protection products) throughout the territory (including the overseas departments)

Although studies are regularly carried out on the exposure of the population to agricultural pesticides, there is no data representative of the French population on exposure to products used in homes, gardens or to treat animals.

As a continuation of this action, ways of reducing use and promoting alternatives to biocides can be tested.

Leaders: DGPR, DGAL

Partners: Anses, ORP, CGDD-DRI, InVS, INERIS, DGOM

Action performance indicators: returns from the survey of uses; production of culture-exposure matrices in the overseas departments; carrying out health risk assessments

2.1.3 Improve knowledge of emerging substances in water

Action No. 32: monitor priority emerging substances in aquatic environments and catchment areas for water for human consumption (perchlorates, bisphenol A and substances in the family of nitrosamines, parabens and phthalates)

This action follows the work on prioritising substances in water following the 2012 environmental conference. National exploratory campaigns have already been carried out for some of these substances in water intended for human consumption. In addition, a national report on the presence of **aluminium** in water intended for human consumption will be produced.

Leaders: DEB, DGS

Partners: ONEMA, Water agencies, Anses, Aquaref, CGDD-DRI, INERIS, BRGM

Action monitoring indicator: number of measurement campaigns carried out

Action No. 33: carry out post-marketing authorisation follow-up for plant protection products and relevant metabolites containing active substances for which there are no current methods of analysis in France and for which the quantification threshold is higher than the “effect concentration” determined by INERIS in support of the implementation of the Water Framework Directive

Leader: DEB

Partners: Anses, DGAL, INERIS, ONEMA, CGDD-DRI

Action monitoring indicators: number of post-marketing authorisation follow-ups carried out; number of anticipated revisions of marketing authorisations in this framework

2.2. Establish a corpus of indicators to obtain a comprehensive and integrated view of the history of exposures to chemical, physical and infectious agents (EXPOSOME)

Analytical methods and tools developed in recent years must integrate the behavioural, demographic, geographic and temporal dimensions in order to better define the health impacts in areas where different sources of pollution are superimposed and allow integration of socio-economic factors and vulnerability. To do so, the evaluation of exposures should now be designed in a decompartmentalised and dynamic manner. It must take into account the way of life and the space-time budgets of populations (distribution in time and space of travel and activities). The life of an individual involves periods of gradual

change in the exposure profile and phases of deep change, more or less sudden, linked to events (new occupation, medical treatment, etc.). In general, the perinatal period, childhood, adolescence and the years of reproductive life are key moments of existence in terms of variation in exposure profile and health consequences. The strategy of a partial characterisation of the exposome at various key moments can be retained as an alternative to its continuous measurement, which is difficult to envisage.

The emergence of the exposome concept implies the improvement of knowledge about the sciences of exposure through the development of innovative methodologies and technologies, combining the life sciences and physico-chemistry. The novelty of the notion of the "exposome" is to combine classical approaches to the characterisation of exogenous exposures (external dose of an individual or a population) to the so-called "-omics" approaches to characterise exposure in an integrated way via the damage to target organs by considering the overall biological response (biomarkers, biological disturbances) and the associated mechanisms of toxicity (systemic toxicology).

This concept thus establishes the link between the contamination of environments and exposure biomarkers, and even early effects. It makes it possible to appreciate the continuity between the "environment" approach and the "pathology" approach.

Action No. 34: identify and analyse methods for constructing spatialised and integrated exposure indicators

Different exposure indicators are already commonly used or deserve to be generalised or developed, from the simplest when it comes to the accumulation of several pollutants by a single route of exposure to the most integrative, to approach the reality of real situations. The existing tools to calculate organ intakes from exposure to a pollutant and the permanence of this pollutant in the organism will be made available. It is thus possible to define operational indicators to be compared with the biological response. The action will also aim to define composite indicators aggregating different routes and different pollutants.

Leaders: DGPR, DGS, DGT

Partners: INERIS, Anses, InVS, CGDD-DRI

Action performance indicator: establishment of a corpus of indicators

2.3. Characterise exposures at the territorial scale, taking into account inequalities in the vulnerability of populations

2.3.1 Protect the health of vulnerable people (children, pregnant women)

Children constitute a vulnerable population due to different factors: their metabolism and defences are different, they are in a phase of differentiation and active cell proliferation, the periods of pre-puberty and puberty are accompanied by hormonal changes and differentiation of certain tissues. Moreover, their behaviour (play) exposes them differently than adults to pollutants.

In addition, children's food intake contains more fruit, vegetables and dairy products, and the amounts and doses of ingested contaminants per kg body weight are proportionately greater than in adults. The same is true for inhalation, where the weight-expressed rates are twice as high in children, given the specific nature of their breathing (hyperventilation).

More and more studies point to the greater vulnerability of pregnant women and their future babies (intra-uterine exposure) to different pollutants, with very diverse exposures: food, water, air, cosmetics, etc. Pregnant women also constitute a particularly vulnerable population. It should be noted that in addition to the specific actions relating to the protection of the health of vulnerable people presented in this paragraph, other dedicated actions are included in the remainder of the document.

Diet

Action No. 35: acquire data on chemical contamination in food (especially for new compounds in food (acrylamide, furans, PAHs)) and exposure, including in sensitive individuals (children), through the finalisation of the infant EAT study

In continuation of the Total Diet Study 2 (EAT 2), in 2010 Anses launched the infant EAT. The purpose of this study is to assess dietary exposure by focusing on the population of children under 3 years of age.

Leader: DGAL

Partners: DGS, DGPR, DGCCRF, Anses

Action performance indicator: publication of the data on the chemical contamination of food

Action No. 36: evaluate exposure to nanomaterials in foodstuffs

Substances such as nanomaterials may be present in foodstuffs. **Since December 2014, European Regulation No. 1169/2011 on consumer information on foodstuffs has introduced compulsory labelling of the "nano" form of ingredients.** As of that date, the term "nano" should therefore be included on the list of ingredients in foodstuffs containing nanomaterial(s).

For example, among the list of nanomaterials present in foodstuffs are **titanium dioxide nanoparticles used as a white dye (E171) or silica dioxide.** This labelling will **contribute to information on and traceability of nanomaterials.** However, this measure does not contribute directly to health risk assessments: targeted actions should be pursued to improve the state of knowledge in this field, both for consumer exposure and possible toxic effects of these substances. An opinion from Anses in 2014 stressed that there is insufficient data to carry out a risk assessment of the nanomaterials contained in foodstuffs. The priority is therefore to continue evaluating consumer exposures in order to identify the different

nanomaterials in foodstuffs (identification and use of the reporting system by health safety agencies). The second lever is to continue the toxicology work, especially for the oral route and chronic exposure to low doses.

Leaders: DGCCRF, DGAL, DGS, DGPR

Partner: Anses

Action performance indicators: number of families of foodstuffs identified; identification of the types of nanoparticles used in food

Exposure to LEDs

Action No. 37: updating risk assessment for blue light exposure in at-risk segments of the population

Exposure to light is essential for most living organisms; in humans, light regulates biological rhythms and a number of vital functions depend on it.

However, exposure to light also has a number of negative effects. Our eyes and skin are the most sensitive to optical rays. Certain exposure conditions can lead to burns, melanoma, carcinoma, lens damage (cataracts) and damage to the cornea and retina. Blue and UV light are particularly dangerous in terms of retinal damage, referred to as "blue light hazard". This short-wavelength light is highly present in the emission spectrum of certain light-emitting diodes (LEDs), in particular "cold white", blue and near-UV LEDs, which are now being widely used to replace existing forms of interior and exterior lighting. Current ophthalmic research is examining the accumulated lifelong effects of retinal exposure to blue and violet light, especially that which can lead to age-related macular degeneration (ARMD). The Anses and SCENIHR have both published reports (in 2010 and 2012 respectively) on the health effects of artificial light, and have formulated a number of recommendations. Three segments of the population have been identified as particularly sensitive to the health risks of exposure to blue light, as a result of their reduced ability (or inability) to filter short-wavelength light (particularly blue light) due to the composition of their ocular lenses. These are: children (whose lenses are more transparent) and persons with aphakia (no lens) or pseudophakia (fitted with artificial ocular lenses).

However, the pace of development and widespread use of the technologies involved means we must now update our expertise in order to ensure the most pertinent preventive actions are put in place.

Leaders: DGS, DGPR, DGT

Partner: Anses

Action performance indicator: publication of Anses recommendations

2.3.2 Providing a clearer picture of disparities in environmental and regional health levels

Levels of environmental damage vary from region to region in France. In some geographic areas, the environment has been strongly impacted by present and past human activity.

Reducing environmental inequality involves, firstly, identifying multi-exposure areas and the most critical situations on various scales (global, regional and local); when assessing levels of exposure, the environmental and behavioural dimensions of local populations must also be taken into account. In addition, defining these inequalities requires access to spatial data pertaining to nuisances and pollution on a detailed regional level. It is also necessary to reconstruct this data and develop a completely new methodology in cases where there has been an accumulation of exposure to toxic substances (both chemical and biological) and physical elements, which will require prior access to data for the various environments involved (air, water, soil, etc.). However, such data is rarely available on a spatial scale that is adapted to the individual issue and environment in question.

Action No. 38: develop and distribute, via a common platform, reference methodologies to be applied at the national level in order to characterise environmental disparities on a local level, while taking into account the state of vulnerability of local populations

Leader: DGPR

Partners: INERIS, DGS

Action performance indicator: publication of methodologies providing a clearer picture of environmental inequalities

Action No. 39: use environmental inequality analysis tools in order to cross-reference exposure data modelling with population data (biosurveillance and epidemiological data, social and health vulnerabilities)

Leader: DGPR

Partners: INERIS, InVS, DGS

Means of action indicator: number of regions having included the use of these tools in their PRSE (Regional Social and Environmental Plan)

Action No. 40: as part of PRSE measures, carry out multi-exposure studies across several different regions based on methodological reference data

Leader: DGPR

Partners: INERIS, ARS

Action monitoring indicator: number of multi-exposure studies

Action No. 41: facilitate the collection and use of data gathered at local, regional and national levels

Leaders: DGPR, CGDD, DGAL

Partners: INERIS, SOeS, ARS

Action performance indicator: -

Action No. 42: establish air quality maps for sensitive zones

Establish "Strategic Air Quality Maps" (*Cartes Stratégiques Air*, or CSAs) that will show, on a detailed geographical scale, the levels of certain specific pollutants in sensitive areas. These maps will aid interested local councils in their decision-making process, particularly in matters of urbanism and local development.

Leader: DGEC

Partners: AASQA, INERIS/LCSQA, ATMO France

Action monitoring indicator: number of CSAs compiled

Action No. 43: analyse disparities in the incidence of Legionnaire's disease across regions (notably the east-west gradient, e.g. the tenfold difference between Brittany and Alsace in 2013) and identify action methods to be implemented

Actions being undertaken to reduce cases of Legionnaire's disease must be based partly on existing knowledge of the bacteria (exposure of individuals to the disease, legionella detection methods, etc.), and partly on efforts to mobilise all relevant parties, especially those involved in disease prevention, health monitoring and management of at-risk facilities.

Over the duration of France's two national health and environment plans (2004-2008 and 2009-2013), the number of reported cases of Legionnaire's disease in France was between 1170 (2011) and 1540 (2010); 1262 cases of Legionnaire's disease were reported in 2013, of which 7 originated in overseas territories. The incidence rate for reported cases of Legionnaire's disease in mainland France was 1.94/10⁵, with a mortality rate of 12.2% (143 deaths). Along with Italy, France has the highest number of reported cases of Legionnaire's disease among European countries, and therefore retains a significant amount of data on the subject. In particular, over the last several years this data has shown a geographical East-West gradient for incidence rates of the disease: in 2013, the rate varied from 0.4/10⁵ inhabitants in Brittany to 4.4/10⁵ inhabitants in Alsace. A study published in 2012 on the quantitative evaluation of the monitoring system concluded that the exhaustiveness rate for reporting, estimated at 88%, could not explain the disparity in incidence rates, and that additional studies (particularly ecological) would need to be carried out in order to explain the spatio-temporal variations observed.

Leader: DGS

Partners: ARS and CIRE, InVS

Action monitoring indicator: multi-factor study providing an explanation of the incidence disparity rates for Legionnaire's disease across the French territory.

2.4. Making environmental health data more usable and accessible, and improving emergency detection systems

As is the case in a number of areas, **the topic of environmental health is currently facing a rapid accumulation of large amounts of data.** The "big data" in question, whether pertaining to the environment or health, is sourced from a wide range of data production sources, sometimes of disparate quality, and currently is not easily accessible or being shared in the manner outlined by the European "Inspire" Directive. On occasion, we have noted a certain **reticence about making data available, for fear of stigmatising a region or of the effect on property values.**

Databases are currently being developed and undergoing widespread expansions: in France, initiatives to monitor environmental quality (such as networks monitoring the quality of air, water, soil and biodiversity) are run by different agencies, institutes or observatories, and a large number of databases are now available (due also to the upsurge in Internet use).

However, simply compiling these types of databases does not always ensure their ease of use, nor the ability to cross-reference or use their data in conjunction with other sources, meaning that additional work on the interoperability of databases may be required.

This data reflects contamination levels in given areas, and can allow us to compile variables to provide a clearer picture of the exposure levels of local populations or environmental inequalities. Research is sometimes among the uses initially planned for these databases, but often this is not the case for existing databases, which are compiled for the purposes of surveillance, management or monitoring of health and sanitation regulations.

Opening up a large number of these databases to researchers, or even the general public, would serve as a huge source of information that could contribute to furthering knowledge in the field of environment-health research.

In this regard, the **“Environmental Public Health Tracking” plans and programmes developed in the US represent an interesting model**, collecting data at a local, regional and national level for environmental health monitoring.

The European Environment and Health Information System (EHIS), meanwhile, integrates comparable data and information on priority topics in order to establish links between environmental conditions and public health, in order to guide and direct public policies.

It may be necessary to obtain new data, but above all it is **crucial that we facilitate access to this data in order to correctly analyse, use and interpret the information available, thereby improving understanding of the issues and developing targeted public policies.** Therefore, it is important that we create the means for this to occur. While in terms of overall transparency it is already worthwhile making this data available to a wide number of stakeholders, researchers, risk assessors and organisations, it is above all essential to provide methodologies for use of this data based on robust scientific approaches, and, where health-related data is concerned, to regulate access and methods of use under legal and ethical safety conditions with respect for both collective and individual interests.

Action No. 44: facilitate access to and use of exposure data

- Identify the main databases covering the contamination of environments by topic, as well as the main data collection and access requirements of users in the environmental health sector; publish and distribute information regarding the main features of these databases and available search tools.
- Facilitate access to environmental and health-based databases for interested stakeholders, risk assessors, epidemiologists and environmental health researchers.
- Compile and publish a methodological report.

Leaders: DGPR, SGMAP

Partners: Anses, INERIS, INSERM, CGDD-DRI, DGS, ATMO France, the AASQA network

Action performance indicator: interoperability of environment-health databases

In addition, it is also **necessary to improve our understanding of the use of chemical products in order to properly assess the general public's exposure levels.** This data is largely held in the National Products and Ingredients Database, which is operated by France's anti-poison centres. This database should be enlarged and made available for use by health agencies, while also respecting the confidentiality of this industrial and commercial data.

Action No. 45: develop the National Products and Ingredients Database and the forwarding of information from anti-poison centres in order to better assess the risks associated with chemical substances

France's national Products and Ingredients database (BNPC), operated by the country's anti-poison centres, includes information on the composition and usage categories of chemical compounds. This information is acquired via requests issued by anti-poison centres to those responsible for placing products on the market, as well as declarations made by industrial groups, either voluntarily or in order to meet regulatory requirements.

There have been calls to progressively expand this database in line with the progressive increase in regulatory requirements regarding the declaration of composition details for compounds classed as dangerous (French government decree issued on February 14th 2014 on toxicovigilance, and EC Regulation No. 1272/2008, known as the "CLP"). Industrial groups must also be encouraged to openly declare information on compounds not classed as dangerous, as information on their composition may still be required by anti-poison centres in order to provide advice on how to proceed in the event of exposure.

This data is also useful to the Anses in terms of risk assessment for chemical substances and compounds, as they provide information about the overall propagation of substances on the market. The data is also useful for linking certain compounds with symptoms encountered in anti-poison centres when exposure has occurred, allowing health experts to establish information regarding the effective risks of dangerous compounds and to highlight as-yet unknown risks associated with compounds and substances that have not yet been classed as dangerous. In accordance with France's public health code, the Anses organisation is required to respect industrial and commercial confidentiality when using data made available in this regard.

These informative actions on the part of those responsible for bringing products to the market must be undertaken in order to promote both regulatory and voluntary declarations. In addition, we must also remain vigilant regarding the proper functioning of the electronic portal used to submit declarations on product compositions.

Leader: DGS

Partners: DGT, DGOS, DGPR, Anses, INRS, CAPTV, ASIP

Monitoring indicator: annual number of composition declarations included in the national database of products and ingredients (BNPC) of anti-poison centres; annual number of Anses reports compiled using BNPC data

Action No. 46: work to improve availability and sharing of data to improve understanding of the dangers of exposure to human and veterinary medical residue via the water supply

This initiative is closely linked to the water-borne micropollutants plan. It will involve working with human and veterinary pharmaceutical companies, pharmacies, and agencies tasked with the assessment and authorisation of human and veterinary medicines, as well as with the European Commission in order to facilitate access to relevant data in order to assess:

- dangers: ecotoxicity and toxicity data for the molecule and its metabolites in environmental quantities. For this we will study the feasibility of developing monographs for active substances used in human and veterinary medicine. The objectives of these monographs will be to improve our understanding of the environmental risks associated with human and veterinary medicine, and to facilitate knowledge sharing;
- exposure: data relating to sales of medicines, improved knowledge of effects of water treatment channels.

An exploratory phase will involve a selection of a hundred human and veterinary medicines, including a significant proportion of antibiotics and anti-cancer medications; this phase will take up the first two years of the plan.

Leaders: DEB, DGS

Partners: ONEMA, European health agencies, pharmaceutical unions, water treatment professionals, water agencies, DGAL, ANSM, ANMV (Anses), CGDD-DRI

Action monitoring indicator: number of monographs published

Action No. 47: supplement and expand programmes aiming to determine reference levels for soil contamination (improving understanding of background noise and levels of contamination by organic pollutants and emerging substances). Based on existing tools (BASIAS, BASOL, etc.), implement new tools for making soil information available to the public and various sectors as outlined in Article 173 of the ALUR law.

BASIAS is the acronym for a French database created in 1998 in order to collect and record for posterity a list of "former industrial and active service sites" (whether currently abandoned or not) likely to have left behind polluted facilities or soils (indicating that not every site listed is necessarily polluted).

This database (acting to supplement the BASOL database) is publicly-accessible, and is one of the tools that may be used to spread awareness of polluted sites and soils. The ALUR law in France has been implemented in order to create a system of soil information sectors - areas in which known levels of soil pollution call for the implementation of management measures, especially in cases where the mode of usage needs to be changed. In 2015, decrees issued in order to apply the law will be adopted, and the tools necessary to create these resources will be put in place. Soil information sectors will then be established, following a progressive schedule. This initiative will build on existing databases available to public bodies, in particular the BASIAS and BASOL.

Leaders: DGPR, CGDD-DRI

Partners: BRGM, INERIS, ADEME,

Action performance indicators: completion of measurement studies; initial implementation of soil information sectors.

Action No. 48: improve efficiency of monitoring and alert systems in order to improve emergency detection processes

Environmental health monitoring revolves around various issues: health risks linked to environments or agents, diseases which may potentially be linked to the environment, segments of the population which are particularly sensitive to certain environmental conditions, and also the links between environmental exposure and public health issues. **Since 1998, tools have been put in place for health monitoring and security** with a view to anticipating crises and providing an optimum response. In terms of environmental health, the legislative and regulatory measures protecting whistleblowers are entering a new phase with Law No. 2013-316 of April 16th 2013 on independent expertise regarding public and environmental health and protection of whistleblowers.

Leader: CGDD

Partners: Anses, InVS, DGPR, DGS

Action performance indicator: establishment of the national whistleblower ethics commission for public and environmental health, as stipulated in French law of April 16th 2013.

2.5. Acting to improve environmental quality

2.5.1 Acting to improve interior air quality

Improving indoor air quality is a key factor in environmental health progress. A number of agents and substances are found in our indoor environments. These substances **have various points of origin: exterior emissions, human activity (combustion engines), construction materials, furniture, decorative products, organic substances, etc.** In addition, the amount of time we spend in enclosed spaces (70 - 90% on average, including homes, workplaces, schools, transport vehicles, etc.) makes this a public health concern. In order to improve our understanding of interior air pollutants and provide public bodies with the necessary information to assess and manage related risks, the Observatory for Interior Air Quality (OQAI) was created in 2001.

Certain carcinogenic pollutants may be found in indoor air. A wide and varied range of health issues may potentially be linked to poor indoor air quality, particularly diseases of the respiratory system (including rhinitis and bronchitis). **Poor indoor air quality can also lead to symptoms such as headaches, fatigue, eye irritation, nausea, etc.** Conversely, improved indoor air quality in a building has been observed to have positive effects on rates of absenteeism, wellbeing of building occupants, and improved learning capacity in children.

It is essential that we **continue to study the health effects of indoor air pollution**, especially the links between exposure to pollutants and the development of a given illness or symptom. However, the existing knowledge base has already allowed us to undertake preventive actions, particularly in enclosed spaces as part of the second Health and Environment Plan (PNSE2), including the introduction of labels which indicate emissions levels for volatile pollutants issuing from construction and decorative products, and the development of a new professional occupation with the title of "Indoor Environment Advisor" (*Conseiller en Environnement Intérieur*, or "CEI"). These measures are designed to prevent the onset of illnesses and symptoms in at-risk segments of the population, such as children, toddlers and pregnant women. Reflecting the concerns expressed at the health-environment health round table discussion held at the first Environmental Conference in September 2012, the government published an action plan for Indoor Air Quality in October 2013, which outlines short- and long-term initiatives to improve air quality within enclosed spaces.

Action No. 49: implement the government's Indoor Air Quality Improvement Plan

As outlined in the roadmap for ecological transition drawn up at the 2012 Environmental Conference, **an Indoor Air Quality Improvement Plan (*plan de la qualité de l'air*)**

intérieur, or PQAI) was published by the government on October 13th 2013, following a consultation with the National Council for Ecological Transition, the National Air Council, the National Environmental Health Plan monitoring body and the scientific advisory body of the Indoor Air Quality Observatory (OQAI).

The PQAI comprises 26 individual actions across 5 categories:

- Informing the general public and stakeholders holding public advisory roles
- Developing a labelling system for products likely to emit indoor air pollutants
- In the building sector, developing incentivising actions and preparing for regulatory developments linked to energy performance requirements
- Improving performance on the ground regarding specific pollutants
- Broaden knowledge

The government is committed to the implementation and strategic oversight of the indoor air quality plan. As such, in September 2014, the Minister of Ecology decided, working alongside the Ministers of Health and Housing, to simplify and increase the efficiency of the measures outlined in the PQAI for monitoring air quality in schools and nurseries.

In order to avoid spawning a multitude of new organisational structures, this action plan should be integrated into the PNSE3, with shared governance for the two plans.

The PQAI is intended to be applied at a regional level within the regional health and environment plans (PRSE3). The PNSE monitoring group will also benefit from the support of stakeholders specialising in this subject area, in order to provide targeted oversight for the issue in question.

The involvement of a CEI in order to aid patients suffering from illnesses linked to, or likely to be exacerbated by, poor indoor air quality, is subject to an assessment carried out as part of the hospital clinical research programme (PHRC) (cf. Action Y from the indoor air quality plan), from which it will be necessary to draw appropriate conclusions before proceeding.

Leaders: DGPR (co-piloted by DHUP and DGS)

Partners: INERIS, CSTB, OQAI, CEREMA, ADEME, INPES, FNES, IREPS, AASQA, CGDD-DRI, ATMO France

Action monitoring indicators: number of PQAI actions considered to have been successfully implemented; number of active CEIs in French regions.

2.5.2 Acting to improve interior air quality

Since June 2012, the International Cancer Research Centre (ICRC) has classed combustion engine emissions as carcinogenic (Group 1) in humans. In 2013, the same body classed atmospheric pollution and outdoor air particles as carcinogenic in humans.

Reductions in industrial and vehicle emissions have enabled significant improvements in levels of heavy metals and sulphur oxides. However, the concentration of nitrogen oxides and ozone in the air may be high in certain areas. Particle pollution remains a significant issue both on a local and global scale, and is a long-term concern reaching critical levels during times of peak pollution. The atmospheric formation of secondary particles (based on precursors such as nitrogen oxides, volatile organic compounds and ammonia) must also be taken into account. In this regard, a number of actions have been planned **in order to reduce emissions linked to low-performance or obsolete wood-fired household heating.** In addition, targets for reductions in ammonia (NH₃) emissions will be strengthened. These are part of the revision of the 2001/80/CE Directive pertaining to emission caps, which also apply to other forms of gaseous and particle pollution. Careful attention will be paid to the agricultural sector, as **97% of national NH₃ emissions are produced from farming activities.**

In terms of illnesses, **the prevalence of respiratory allergies such as seasonal rhinitis and allergy-related asthma seems to have increased over the last 20 years** in industrialised countries. Furthermore, while allergic rhinitis constitutes a risk factor for the development of asthma, the condition itself has also seen heightened levels of severity.

Aside from a series of landmark actions to reduce air pollution emissions, efforts must also be made for all sources of emissions involved, whether involving road and non-road transport (cars, delivery lorries, cargo shipping, air freight, construction vehicles, etc.), agriculture, residential and tertiary sectors as well as the industrial sector.

Finally, in addition to specific research work, improving knowledge requires **refined data (measurement and data modelling) for "air risk" zones** (i.e. densely-populated areas, those with high transit levels, areas with specific topographical or meteorological conditions) by implementing meteorological modelling and particle dispersion models, as well as specifically-adapted and highly-detailed inventories ("strategic air maps"), by installing mobile research stations and studying mass movements of air at low altitudes across specific areas (such as in enclosed valley regions and/or poorly-ventilated areas, or zones with high population densities).

Action No. 50: develop a new programme to reduce atmospheric emissions of pollutants harmful to human health and linked to climate change

In order to apply the upcoming "revised NEC" (National Emission Ceilings) Directive and its associated emission caps, regarding the regulatory requirement to revise the Ministerial Decree of July 8th 2003 providing approval for a national programme for the reduction of gaseous atmospheric emissions (SO₂, NO_x, COV, NH₃, CH₄) and particulates (PM 2.5) in ambient air, it is necessary to develop a new emissions reduction plan (PREPA). This plan forms part of the draft legislation for the law on energy transition for green growth.

The PREPA also takes into account objectives for air quality defined over the course of the "Air Quality" Directive, especially vis-a-vis pollutant levels in ambient air and the various action plans (Atmospheric Protection Plans - PPA). The PREPA constitutes our governmental strategy to reduce atmospheric emissions and protect public health by reducing pollutant levels in the air. It will combine a series of top-down actions having been evaluated on a technical, economic and social level and will target all pollutants and all sectors of activity. The measure will build upon a number of other tools (e.g.: the PPA, Regional Air, Energy and Climate Schemes (SRCAE), communications, etc.). The following initiatives are being planned:

- **Reinforcing environmental health action in the transport sector**, particularly by giving local councils the ability to implement traffic restrictions for the most polluting vehicles in certain areas, and via the application of incentives for the conversion of older diesel vehicles in PPA areas.
- **Implementing actions to reduce emissions caused by low-performance and/or obsolete wood-fired domestic heating systems**, as well as those caused by agricultural activity.

As regards climate change and particle pollution, it must be noted that several reports have indicated that carbon soot is a significant factor in climate change, and the particulate matter (PM) emitted from diesel exhausts contains a greater proportion of carbon soot than other sources of PM emissions.

Leader: DGEC

Partners: interministerial boards and air quality stakeholders

Action performance indicator: publication of the PREPA in late 2015

Action No. 51: reduce emissions from the residential and agricultural sectors

Despite a reduction in emissions from the domestic sector in recent years, it remains responsible for 22% of PM10 emissions and 34% of PM2.5 emissions. Within the sector, wood-burning heating systems account for a significant majority of emissions (over 90 %). Comparison reveals that these levels vary based on the type of heating equipment involved: an **open fireplace emits 6 - 8 times more particles than one which has been fitted** with an insert to improve performance. A wood-fired domestic boiler emits up to 15 times less particles than an open fireplace. A fire burning for 2 hours in an open household fireplace emits as many fine particles as 2100km of driving in an old diesel vehicle not fitted with a particle filter. For this reason, a number of actions are also being planned to support a reduction in emissions caused by low-performance or obsolete wood-fired domestic heating appliances (such as communication campaigns and incentives to replace low-performance wood-fired heating appliances, targeted mainly towards the most polluted regions).

In France, **agricultural activity is the cause of 97% of NH3 emissions**, which is a precursor gas for secondary particles. For this reason, action will need to be taken regarding techniques for the spreading and storage of livestock effluent, which is a major emitter of NH3. At a minimum, it will also be necessary to take action on ploughing and harvesting techniques that emit the largest amounts of primary particles.

Leader: DGEC

Partners: local councils, chambers of agriculture, DHUP, ADEME, DREAL, MAAF, INERIS

Action monitoring indicators: evolution of the existing stock of wood-fired domestic heating appliances, number of covered slurry beds; evolution of spreading equipment; reduction in ammonia emissions across the national inventory (taking into account reduction techniques and quantification of the effective reductions achieved), where possible integrating its effects on GHG and other relevant pollutants (e.g.: NOx); maintaining land as pasture (as these grazing systems cause less emissions overall).

Action No. 52: improve knowledge regarding air quality on different scales in order to gain a clearer picture of pollution sources

It is necessary to improve the availability of information regarding air quality on various spatio-temporal scales (using geo-climatological and meteorological approaches and data modelling) as well as our understanding of the chemical make-up of these particles.

In particular, the **Primequal research programme will be mobilised for this purpose, along with other initiatives such as the CARA programme**, whose objective is to determine the contribution of various sources of pollution and to evaluate the toxicity of the particles being measured, by classifying sources of particle pollution based on the chemical make-up of the main types in real time using the fine fraction of PMs (ammonium nitrate and

sulphate, organic matter and carbon soot). Financing is being sought from the French National Research Agency (ANR).

Leader: DGEC

Partners: INERIS/LCSQA, inter-university laboratories, ANR, CGDD-DRI (Primequal programme), ATMO France, AASQA network

Action performance indicator: active data use: annual report on the chemical make-up of PMs (coordinated by INERIS/LCSQA), projects supported by the ANR

2.5.3 Acting to improve water quality

Improving our assessment of the potential health risks posed by micropollutants in aquatic environments and water intended for human consumption

In October 2010, the Minister for Ecology initiated the **national action plan to combat micropollution in aquatic environments** (potentially toxic or eco-toxic substances present in extremely small doses, in the range of micrograms per litre). This action plan aims to meet the objectives of the **Water Framework Directive** (preventing further damage to bodies of water, maintaining the positive state of surface water in 2015 for 66% of water bodies, and the reduction or elimination of emissions of priority substances as of 2021). In addition, an action plan to combat medical residue in water was jointly published by the Ministries of Ecology and Health in May 2011, taking into account the new and highly specific nature of the subject in question. A plan on polychlorinated biphenyls (PCBs) for the 2008 - 2013 period has also been developed, in order to reduce PCB waste and improve our understanding of their future role in our environment, and to gather information on health risks and preventative measures.

As part of the "Reduction of Dangerous Substances in Water" (French: RSDE) initiative from the PNSE 2, **obligatory monitoring of levels of regulated micropollutants has been applied to waste water from environmentally-registered facilities (ICPE) subject to authorisation, as well as water treatment stations serving more than 10,000 Eq-Hab, since 2009.** In addition, work has been carried out to identify relevant substances according to each sector of activity. This work should provide a clear picture of which types of pollution need to be reduced as a priority, followed by the **implementation of a systematic monitoring process for these substances as waste in 2014.**

Despite the existence of these various plans, which also aim to anticipate initiatives that will need to be undertaken for substances not currently regulated, in recent years public bodies have been faced with instances of water pollution by micropollutants (nitrosamines, perchlorates, PFCs, etc.), which on occasion have led to usage restrictions on catchment basins for water destined for human consumption, or consumption of fish and seafood caught in these waters. This is explained by the quantity of chemical substances (around 100,000) available on the market, and our inability to systematically monitor every one of these in the environment due to the technical and economic constraints involved. The objective of the PNSE3 aims to prioritise actions that will improve our knowledge of these emissions (sales, uses, etc.). **Research campaigns remain to be carried out in order to**

improve knowledge and understanding of the toxicity of pharmaceutical residues. It will also be necessary to support research programmes in order to establish powerful and reliable detection techniques for water testing, as certain pollutants may be present in doses inferior to quantification levels (as is the case for phytopharmaceutical products).

Action No. 53: develop a "micropollutants" plan

The new "micropollutants" plan must integrate the existing plans regarding pharmaceutical residue in water and PCBs.

Leaders: DEB, DGS, DGAL

Partners: DGPR, DPMA, DGE, CGDD-DRI, ONEMA, Aquaref, IRSTEA, INERIS, BRGM, CEREMA, Anses, water agencies

Action performance indicator: publication of the plan

Action No. 54: improve the extent to which endocrine disruption is taken into account in our environmental guideline values for micropollutants which are also endocrine disruptors in aquatic environments

Leaders: DEB

Partners: ONEMA, Anses, INERIS, CGDD-DRI

Action monitoring indicator: number of guideline values defined

Reducing health risks related to the water supply

In France, drinking water delivered via the general water supply is generally of good quality. Nevertheless, **improvements can still be made in order to ensure tap water is of the highest quality for all consumers**, particularly within smaller distribution networks where quality levels tend to be lower.

Tap water is the **most-tested food substance in France** and is subject to regular sanitation monitoring, ensuring strict oversight and guaranteeing quality levels for the public. This monitoring includes:

- **Monitoring carried out by those in charge of water production and distribution** (such as the local council or its delegated service provider);
- **Health and sanitation checks carried out** independently of distributors, by France's Regional Health Agencies (ARS) in application of regulatory requirements.

Tap water quality is assessed based on regulatory requirements defined by the French Health Ministry (measures set by the European Commission and/or additional measures

resulting from sanitation risk assessments carried out by national agencies, mainly the Anses) and examines 60 bacteriological and physio-chemical parameters or groups of parameters (such as pesticides, for example).

The frequency of sanitation testing varies based on volumes of water being distributed by treatment and production facilities, as well as the number of people in the distribution network.

In France, the **production and distribution of tap water is achieved via the use of 33,000 catchment basins and 20,000 water treatment stations of drinking water production facilities.** The number of catchment basins varies from a few units in highly urbanised counties to over 900 per county in rural or mountainous regions. **Most catchment basins gather subterranean water (95%)** and are small in size: around half of catchment basins deliver only 2% of total water produced. As is the case for catchment basins, water treatment stations and distribution networks vary greatly in size and format. **Potable water production facilities pumping over 10,000 m³/d are relatively few in number, but process a significant proportion of the national water supply:** around half of the water gathered is processed by less than 2% of stations. Small distribution networks serving less than 500 inhabitants form a large majority: almost 60% of networks serve only 3% of the population. Water testing is carried out in catchment basins, water treatment stations and in consumer households, and each year involves the gathering of **over 303,000 samples and generation of 12.3 million analytical results.**

In recent years, a number of actions (changing water resources, improved treatment processes, etc.) have been implemented by public bodies and those responsible for water production and/or distribution in order to reduce the number of samples failing to meet quality standards, particularly in terms of microbiological parameters. New arrangements contributing to the preservation of water quality have also been put in place in order to combat diffuse pollution (nitrates, pesticides etc.)

In 2012:

96.7% of the population were supplied with drinking water that constantly met the quality criteria set by the Ministry for Health regarding microbiological parameters,

99.1% of the population were constantly supplied with water that met nitrate quality standards,

95.5% of the population were constantly supplied with water that met pesticide quality standards.

Action No. 55: promote the implementation of water supply health and sanitation plans

Promoting the implementation at local level of safety-specific plans for the water supply, based on experimental efforts carried out in Poitou-Charentes (particularly in Deux-Sèvres), alongside efforts to exchange resources and regroup local councils for water services, particularly with regard to the conclusions drawn at the Environmental Conference of September 2013.

The use of the water supply system requires high-performance management which must enable early detection of contaminations in order to limit potential public health effects. Regular testing of water quality as required by the French Public Health Code (transposing the measures outlined in Directive 98/83/EC regarding the quality of WIHC), while essential for public health, does not always sufficiently guarantee this early detection, especially when we consider the frequency analysis applied for small potable water distribution units.

The French Public Health Code calls for the implementation of a permanent water quality monitoring programme, carried out by those responsible for water production and distribution (PRPDE) based on identification of the dangers presented by the water supply system. These monitoring efforts act to supplement the health testing carried out by ARS, and are not limited to analytical verification of water quality, but also include verification of measures being taken to protect the resource being used and the ways in which facilities are operated. A sanitation dossier is also maintained, containing all the information gathered during the monitoring operations. PRPDEs are also encouraged to establish a quality management system that comprises identification of dangers and actions that will enable these dangers to be averted.

Current French legislation integrates the principles of the “Water Safety Plan” approach promoted by the World Health Organisation (WHO), which are due to be inserted into EC Directive 98/83/EC regarding WIHC during the next revision of this document (if the revision is currently underway, the end date is not known; however, we may also refer to specific documents published on the subject by the WHO). It will therefore be beneficial to use a shared vision for water safety on a regional level - one that is up-to-date and well-organised, enabling real-time management of health security and to encourage water producers and distributors to identify and correct weaknesses in their operations, particularly via the implementation of a sanitation security plan for the water supply.

Leader: DGS

Partners: ARS, InVS, water agencies

Action monitoring indicator: number of regional health plans integrating this initiative

Taking into account the significant progress already achieved, the objective is to:

Pursue the water protection scheme initiated by the PNSE 1 and PNSE 2 programmes while also taking local specificities into account, encouraging agro-ecological practices and reaching a target of 600 new water catchment basins protected by “DUP” status per year and implementing action plans to combat diffuse pollution across the 1000

priority water catchment basins throughout the duration of the 2016 - 2021 Master-plans for Water Development and Management (SDAGE).

Action No. 56: implement measures to protect water catchment basins used for the water supply against accidental pollution and diffuse pollution (following on from action 28.1 of the PNSE2)

Initially, this will involve **pursuing the initiative to protect water supply catchment basins via the introduction (by way of a “public utility declaration”, or “DUP” in French), of protective perimeters applied in order to mitigate pollution risks**, while taking into account the recommendations put forward in 2014 by the general inspectorate of Ministries of the Environment, Health and Agriculture. Almost **33,000 water catchment basins are used to produce drinking water in France** - among these, low-flow facilities (100m³/d), which represent 2/3 of total facilities, have a lower overall rate of protection (60%) than other production capacity classes.

The **procedure for establishing protective perimeters for water catchment basins is founded on solid legislative and regulatory bases**. French Law No. 64-1245 of December 16th 1964, reinforced by Law No. 92-3 of January 3rd 1992 and Law No. 2004-806 of August 9th 2004, makes it **mandatory to establish protective perimeters around water catchment basins, including existing basins** (Article L. 1321-2 of the French Public Health Code). As such, the establishment of these perimeters occurs in tandem with the public utility declaration (DUP) for construction or infrastructure projects relating to water intended for human consumption (WIHC). This approach to protecting catchment basins is part of the analysis and risk management strategy advocated by the World Health Organisations (“Water Safety Plans”). Hence, **in June 2014, almost 70% of France’s water supply catchment basins were protected in this way**, representing around 80% of the overall volume of water produced and population supplied. This represents a 30% increase in the number of protected catchment basins in France (+19% of water produced) due to the approach initiated in 2004 by the PNSE 1.

The second aspect involves working towards the objective set by the 2013 Environmental Conference, to protect the feed-in zones around 1000 priority catchment basins which are currently affected by diffuse pollution. These catchment basins will be identified within the Masterplans for Water Development and Management (SDAGE). Protective measures will progress from the development to the implementation of action plans aiming to re-absorb pollution. For priority catchment basins which do not currently have a protective perimeter, the measures contained within the action plans will be studied as part of the installation procedure for protective perimeters for water catchment basins.

Leaders: DGS, DEB, DGPAAT

Partners: DGAL, ARS, DREAL, DRAAF, Prefectures/DDT,

Action monitoring indicators: number of water supply catchment basins with protective perimeters and registered under a public utility declaration (DUP); percentage of the

population whose water supply comes from protected sources; number of priority catchment basins as identified by the Environmental Conference having an adopted action plan.

Reducing the health and environmental risks associated with on-site sewage facilities

On-site sewage facilities (OSSF) are a significant health issue (in terms of protecting populations and drinking water resources) and also an environmental one (contamination of surrounding areas). The issue involves and concerns a wide range of stakeholders: around 20% of the French population, several thousand OSSF public services (French: SPANC), rural politicians and numerous companies, employing a total of 800 people in manufacturing of the equipment and 6,000 people in installation. Due to the complexity of the issue, and acting to supplement regulatory tests and official guidelines for their use, the Ministries of Health and Ecology elected to implement a national OSSF action plan (French: PANANC) over the 2009 - 2013 period. This plan aimed to **meet the objectives outlined in the 2006 Law on Water and Aquatic Environments regarding the quality standards for these facilities in terms of health and environmental risks and setting a schedule for their achievement.**

Due to be completed in late 2013, this plan enabled the implementation of a certain number of actions, undertaken with the aim of creating a global approach that would allow authorities to intervene in the activities of any relevant operators, from the design of processing equipment through to their use by individuals.

The Ministries of Health and Ecology have elected to **pursue the development of a second PANAC over the 2014-2018 period**, which will take into account the conclusions drawn by the assessment project and the approval procedure for on-site wastewater treatment facilities, as well as the technical recommendations produced jointly by the General Council for the Environment and Sustainable Development (CGEDD) and the General Inspectorate of Social Affairs (IGAS).

The Ministry of Ecology will also be working, **as part of the 2012-2018 national sanitation plan, to limit overflow from wastewater treatment stations during heavy rainfall**, in order to **reduce wastewater contamination of aquatic areas and the associated health risks linked to the presence of micro-organisms in bathing areas and shellfisheries, etc.**

Action No. 57: develop a national action plan for on-site wastewater treatment (French: PANANC)

Developing a second national action plan for on-site wastewater treatment over the 2014 - 2018 period, whose main areas of focus will be improving the quality of information available, as well as training and informing OSST operators, ensuring longevity of OSSTs and supporting users on a local level.

Leaders: DEB, DGS

Partners: DGE, IRSTEA, CERIB, CSTB, FNCCR, AMF, ONEMA, water agencies, OIEau, professional and consumer associations, SPANC groups, etc.

Action performance indicator: publication of the plan

Improving the quality of information available and pursuing a regulatory framework for the re-use of non-potable wastewater

During certain periods of the year, water resources can come under significant pressure, especially in the global context of water scarcity caused by climate change. Depending on the intended use, **it is possible to find alternative resources to surface water and potable water**. In certain cases, the re-use of non-potable water (rainwater, treated wastewater, greywater) may be possible, and could constitute an alternative solution for users (local councils, individuals, agricultural operators, associations and federations, etc.). However, there is a possibility that this type of practice could lead to further health/environmental consequences: **therefore, we must enable the development of these sectors while also safeguarding public health and gathering data that will allow us to better assess the health risks associated with certain practices**.

Action No. 58: participate in European efforts to define universal criteria for the re-use of treated wastewater (French: REUT)

The European Commission's initiative is an opportunity for exchange between sanitation agencies and various Member States (transferring knowledge and experience, particularly in matters of epidemiology). These efforts will enable France to revise its own regulations where necessary.

This involves supporting the European approach for the re-use of treated wastewater for agricultural and industrial purposes, which may result in a new European regulation, without specific target figures for the deployment of the REUT, and to support the French position based on existing national legislation regarding the re-use of treated wastewater.

The Anses will be tasked with updating European authorities on recent work carried out in this domain, and will participate in the Commission's various working groups alongside French representatives.

Leaders: DEB, DGS, DGPAAT

Partners: Anses, DGE, FNCCR, ONEMA, water agencies, professional associations

Action performance indicator: definition of European criteria for re-use of treated wastewater

Action No. 59: support experimentation with two demonstrator water purification stations, reusing treated wastewater for purposes not currently sanctioned

This work must be carried out in tandem with the "water quality and scarcity management" industrial plan.

Leader: DGE

Partners: DGS, DEB, professional association

Action monitoring indicator: number of experiments carried out

2.5.4 Reducing exposure linked to environmental soil contamination

Like air or water, **soil is another environment in which pollutants may build up, due to certain industrial, agricultural or urban practices**. Moreover, soil also serves as the interface between other environments. Currently under threat from numerous forms of damage (artificialisation, erosion, salinisation, flooding and landslides), soil plays a number of highly varied roles in our ecosystems (supporting agricultural and residential activity, acting as a biodiversity reservoir, helping to combat flooding, and acting as a valuable carbon sink which helps to mitigate climate change).

There are three particular characteristics to take into account regarding ground soil:

- **Soil is a point of transfer, serving as an interface with aquatic environments (surface water and subterranean water), the atmosphere and the biosphere;**
- **Soil can be contaminated for long periods, or even permanently, by biological and chemical agents, minerals and organic matter, which accumulate in varying levels and to varying degrees of reversibility;**
- **These modifications occur across a much longer timeframe than in other environments.**

Soil contamination comes from a diffuse range of sources (e.g.: atmospheric deposits, agricultural practices) and **standalone local sources**, such as ongoing or past industrial practices. It is also prudent to consider the role played by the extraction and processing of raw materials in creating direct exposure to pollution for populations living in immediate proximity to these sites (workers and residents).

Actions to prevent and reduce exposure must therefore target all such situations, taking into account the specificities of this environmental segment. Measures should also focus on exposure levels in children, as the inhalation of soil particles and presence at polluted sites represents a particularly serious health issue for the younger population.

Action No. 60: work to validate soil transfer models focusing on substances with major health effects (e.g. trace metals, PCBs)

This involves initial work being carried out by the INERIS with the aim of studying the transfer of pollutants between different environmental segments towards human beings, examining substances such as trace metals, PCBs and pesticides.

Leaders: DGPR, DGAL

Partners: BRGM, INERIS, INRA, ADEME, CGDD-DRI (GESSOL programme)

Action performance indicator: INERIS report

Action n°61: carry out the second phase of diagnostics in nurseries, schools, secondary and high schools based on feedback of experience from the initial phase of the “sensitive establishments” operation.

The PNSE 2 calls for (cf. Action 19) reducing exposure to potentially harmful substances in buildings hosting young people, which requires the accurate identification of establishments whose primary occupants are so-called “sensitive” groups located near potentially polluted sites due to former industrial activities. This approach was reinforced by Article 43 of Law No. 2009-967 enacted on August 3rd 2009, known as “Grenelle 1”. The establishments in question are nurseries, preschools, primary schools, secondary schools and high schools, as well as buildings hosting disabled children and centres providing professional training for young people in the public or private sector. Playgrounds and green spaces are also involved.

Leader: DGPR

Partners: DGS, DGESCO, DGER, DGEFP, BRGM, INERIS, ADEME, InVS

Action monitoring indicator: number of “at-risk establishment” diagnostic tests carried out and management plans issued

2.5.5 Protecting the general public from noise pollution

Noise is among the most significant forms of pollution experienced by French citizens in their daily lives and surrounding environments. Based on the latest opinion polls on this subject, **86% of French people said they had been bothered by noise pollution in their home**, caused mostly by transport infrastructures and neighbours. As indicated by the Anses in its 2013 report, levels of exposure to noise from the surrounding environment, such as those experienced near transport infrastructures, have a number of “non-auditory” health effects: some of these have short-term effects (such as sleep disturbance, irritability, etc.), while others require relatively long-term exposure in order to become symptomatic (impaired learning ability, cardiovascular effects, etc.). These effects, which are not specific to noise pollution and may also be observed in other examples of environmental disturbance, are currently not given sufficient consideration.

Aside from environmental noise, **the French population is also exposed to sound levels that could have negative effects on their hearing organs.** Outside places of work, levels of exposure to loud noise, especially in recreational activities, are numerous: these include portable music devices, listening to loud music, nightclubs, concerts, open-air festivals, etc. According to a 2008 opinion published by the European Commission’s Scientific Committee on Newly-identified and Emerging Health Risks, **between 5 and 10% of users of personal**

music devices risk suffering irreversible hearing loss. Based on a study carried out in the Ile-de-France region, **50% of acute aural trauma is linked to exposure to amplified music.**

Finally, in a 2011 report focusing on the health impact of noise, the **WHO calculated that over a million healthy years were lost due to noise exposure in western Europe.** Sleep disturbance and irritability were the health effects responsible for the largest number of healthy years lost.

These findings confirm the importance of pursuing initiatives to combat noise exposure, regardless of the type of noise or the population segment in question.

In the professional sphere, **exposure to noise in the workplace can have harmful effects on health.** In France, over **3 million employees experience prolonged exposure to potentially harmful levels of noise.** In addition, **exposure to noise has been recognised as a cause of workplace illness since 1963** (Table no. 42 of workplace illnesses relating to hearing loss caused by harmful noise). **The average cost of workplace-related hearing loss covered by social security payments is almost €100,000,** making this one of the costliest workplace injuries for the taxpayer.

Action No. 62: combat noise pollution caused by two-wheeled motor vehicles

In the overall hierarchy of noise pollution, **disturbances caused by motorised two-wheel vehicles are the main cause of complaints made to town halls,** and constitute an issue that affects a significant number of people. Though they are most often caused by bad driving or vehicle maintenance (elevated engine speed, exhaust problems, damaged or otherwise modified exhaust), **noise caused by two-wheel motorised vehicles is not technically classed as neighbourhood noise (falling under the jurisdiction of the highway code) nor as standard traffic noise.** For this reason, the noise pollution caused by these vehicles is not covered by regulatory measures pertaining to neighbourhood noise. Moreover, standard methods of dealing with noise levels generated by terrestrial transport infrastructures do not address this problem.

Aside from government actions, educational materials designed for equipment manufacturers might also be envisaged.

Leaders: DGPR, Ministry of the Interior

Partner: CNB

Action monitoring indicator: number of inspection checks of motorised two-wheel vehicles carried out by the Ministry of the Interior

Action No. 63: curbing noise black spots

The concept of a **noise black spot** (French: **point noir du bruit**, or “PNB”) has been introduced progressively over recent years, and the resorption of their noise levels has been established as a major objective in the fight against noise pollution.

The Comop report no. 18 on noise issued by the Grenelle de l’Environnement defines noise black spots as residential, healthcare, educational or social care buildings meeting the criteria for noise exposure via the building’s façade and the date on which the building’s construction permit was obtained (grandfather clause). Noise exposure thresholds are set via regulatory measures. Based on the extent to which the building exceeds these thresholds, it may be classed as a PNB or “super PNB.”

The main issue with PNB resorption resides in the releasing of long-term resources that could enable these actions to be pursued and benefit building administrators across the board.

Leader: DGPR

Partners: CNB, DGITM, DGAC, DGE

Action monitoring indicator: number of PNBs cleared

2.5.6 Protecting the public from health risks linked to the use of pesticides in overseas territories

Chlordecone is an organochloride pesticide classed as a persistent organic pollutant, and can build up in living organisms and is a potential endocrine disruptor in humans. The substance was used for a number of years in French regions of the Antilles in order to combat the banana root borer insect. The pursuit of targeted actions in French overseas territories rendered necessary due to Chlordecone pollution is one of this plan’s objectives.

The French government has implemented significant resources via an initial national action plan (2008 - 2010) followed by a second action plan (2011 - 2013) in order to respond to the chlordecone pollution issue, ensuring the safety of local populations and taking into account the impact of this protection for those who work in fishing and agriculture.

Across the two plans, actions carried out on behalf of the government and its operators cover five main areas of focus:

- **Improving knowledge in a variety of areas:** characteristics of the molecule, determining the extent and development of pollution (particularly via the use of mapping tools), how the molecule is transferred between agricultural or natural ecosystems (both terrestrial and marine), the health effects of exposure to chlordecone and epidemiological studies, determining exposure levels of local populations (dietary habits and contamination of foodstuffs);
- **Protecting the public via inspection testing to ensure foodstuff contamination standards are being respected;**

- **Development and reinforcement of regional testing methods (analysis laboratories);**
- **Raising public awareness via communication campaigns and the Jafa programme promoting family gardens.**
- **Supporting professionals affected by the issue** (mainly farmers) via a farm diagnostics programme, as well as the development of decision-making tools and a financial component (which remains limited due to current budget constraints).

The final report on the first two chlordecone plans and an assessment of the situation in the Martinique and Guadeloupe regions have led authorities to move towards the development of a **third plan, announced by the Prime Minister during a visit to Martinique and Guadeloupe from the 26th - 29th of June 2013**. This plan will **follow on from previous efforts, but will also include new strategic directions regarding sustainable development**. Continuing the work of the first two plans will involve pursuing the actions undertaken to protect the local population (research and monitoring) and to provide support and guidance for those whose livelihoods are affected. This will also involve creating the conditions to improve their quality of life in social, economic, health and cultural terms.

In tandem, initiatives such as the **“sustainable banana plan”**, which aims to significantly reduce the use of phytosanitary chemical substances, should be encouraged. This plan is **designed to finalise and spread innovative techniques on the ground among agricultural producers in the Antilles, enabling them to ensure the sustainability of their banana cultivation systems and thereby reduce environmental impact**. In this way, producers were able to reduce the use of phytosanitary products by 35% between 1996 and 2006. Since 2006, they have continued their efforts and managed to reduce usage by a further 50%. This means that today up to 10 times less products are used than in banana production operations elsewhere in the world. (CIRAD study)

Worker protection must not be overlooked, and a number of actions are under way: **The AGRICAN** inquiry (AGRIculture & CANcer) was launched in 2005 and is set to continue until 2020. This inquiry looks at **health and causes of death in the agricultural sector, particularly cancer**. A group of 180,000 active and retired agricultural workers is being monitored across 12 regions providing a representative picture of agricultural activities in mainland France. The acute health effects of pesticides are monitored as part of the Phyt’attitudes initiative, directed by the Mutualité sociale agricole (MSA) health organisation. This group gathers, validates and analyses symptomological data relating to exposure to phytopharmaceutical products. Exposure profiles for workers coming into contact with phytopharmaceutical products (organised by type of cultivation involved) are being developed as part of the MATPHYTO study. Organised by IVS, this study also takes into account any previously-used agricultural practices.

Action No. 64: implement the 3rd chlordecone plan

Leaders: DGS, DGOM

Partners: DEAL, ARS, CGDD-DRI, DGRI, Alliances

Action performance indicator: publication of the plan

Action No. 65: implement actions aiming to ensure that pesticides distributed and used in overseas territories are authorised products

Leaders: DGCCRF, DGAL, DGOM

Partners: DGDDI

Action monitoring indicator: number of inspections carried out

2.5.7 Protecting the public from exposure to harmful substances contained in consumer products

Pollutants and dangerous substances present in environments (air, water, soils) which go on to contaminate living organisms via various forms of exposure (skin, respiratory, ingestion, etc.) may be released from a range of sources including common consumer products: furniture, toys, detergents, cosmetics, pesticides, textiles, household products, etc. (to name but a few). In addition to the general population, we now know that that young children are the most sensitive to this kind of exposure, due to their behaviour and the vulnerability of their developing bodies. Pregnant women are another group requiring specific protection, as are segments of the population with existing health problems. Actions providing public information via publications and campaigns, for example those which pass on Danish EPA and Swedish (KEMI) data regarding harmful substances in consumer products, may be considered.

In addition to actions concerning the adoption of restrictions on the use of Bisphenol A:

- **France will support the accelerated adoption of restrictions on high-concern substances present in everyday items, in cases where their use is subject to European authorisation as part of REACH.** As such, France has encouraged the European Commission and Chemical Products Agency to carry out an urgent study into the possibility of restricting the presence of 4 phthalates (DEHP, DBP, BBP and DIBP) whose use will be banned in Europe (except for duly-authorized circumstances) as of February 2015. This same approach should be expanded to other substances depending on the final use dates for each one.
- France will **support suggestions from other Member States regarding the reduction of certain substances in everyday items.** As such, France will support the proposal to restrict nonylphenols (a substance identified as an endocrine disruptor, especially in the environment) in textiles. We will also support the concept of a widespread restriction on PFC compounds (some of which are suspected to be endocrine disruptors and/or persistent bioaccumulating and toxic pollutants) announced by Germany in late 2014.

Action No. 66: research presence of endocrine disruptors in toys and childcare products via sampling and laboratory analysis, and implement control measures based on results obtained

This action covers standard state testing carried out by the DGCCRF and DGDDI. The action also includes samples taken from consumer products in order to contribute to risk assessment (financed by the DGPR).

Leaders: DGPR for experimental assessment actions, and the DGCCRF & DGDDI for national testing

Partners: French inter-communal laboratories service (SCL)

Action monitoring indicator: number of lab analyses carried out

Action No. 67: support work to replace substances containing endocrine disruptors

The strategy for tackling the use of endocrine disruptors outlines, in terms of risk management, support for industrial innovation and the implementation of public-private partnerships in order to encourage the replacement of these harmful substances and restrict their use.

Leaders: DGPR, DGS

Partners: INERIS, CGDD-DRI

Action performance indicator: implementation of a substitution platform

Action No. 68: restrict the use of BPA in thermal paper (receipts, bank card receipts)

The use of these substances in consumer items is governed by several European regulations allowing safety precautions to be coordinated across the common market. Drawing on the experience and expertise of its health agencies, France will be proactive in the development of measures to limit the use of dangerous substances in consumer items, and will support the acceleration of European actions and suggestions from other Member States regarding proportional and fast-paced control measures.

Leader: DGPR

Partners: Anses, INERIS

Means of action indicator: product restriction petition filed with EU authorities

2.6. Improving our understanding and management of risks in a context of uncertainty

Certain risks will always be the cause of uncertainty, and may even cause controversy due to the objective difficulty in measuring their effects on health or to a lack of available measures to provide sufficient traceability.

The difficulties recently encountered in terms of risk management in a context of uncertainty may be attributed to the tendency to consider communication with the general public as a separate activity from risk management proper, and a general lack of objective information for the public regarding the risks and benefits of products or technologies. Risk management policies must first bring greater attention to information already available to the public, and the way in which risks are understood by the public. Improving the way we integrate communications and public perception in risk management policies are essential in terms of managing risk in highly uncertain circumstances.

Several actions have therefore been proposed regarding nanomaterials, endocrine disruptors, radiofrequencies, high and very high voltage power lines and light waves.

2.6.1 Contribute to the promotion of European regulatory efforts that are adapted to highly uncertain types of risk

The overall objective of reducing the exposure of people and the environment to dangerous chemical substances must be reflected by a highly-adapted inclusion in regulatory publications. Protecting public health and the environment is a shared interest for all EU Member States. As such, the EU has inter-communal legislation governing the use of chemical products. **In terms of environmental health, France will prioritise the adoption of measures at the European level.** These types of measures enable a greater control of substance-related risks by establishing protective measures across the entire European community, and make it easier to apply the same law to items and substances circulating freely within the EU. In addition, this approach is also more efficient (due to shared workloads) and more effective in terms of risk prevention. In fact, European regulations confer upon Member States the right of initiative, meaning they are able to put forward European measures which will automatically be taken into consideration. This is particularly true of the REACH regulations.

This European regulatory framework nonetheless needs to be consolidated in order to expand its scope to cover a number of emerging topics.

Action No. 69: support the adoption of a European definition and regulatory criteria on endocrine disruptors. Contribute to an impact assessment by the European Commission

Leaders: DGPR, DGT

Partners: Anses, DGS

Action performance indicator: adoption of a common definition

Action No. 70: support a strengthening of the European regulatory framework on nanomaterials: modify REACH annexes and examine the relevance of other options, particularly of a European register comparable with the French declaration scheme

The seventh action plan for the environment constitutes a “joint framework for environmental policy in Horizon 2020”. It is not a catalogue of measures but a guidance document with holistic scope, in contrast to the previous EAP. Entitled, “Living well, within the limits of our planet”, this seventh EAP was put forward by the European Commission on the 7th December 2012 and then submitted to public consultation. It should constitute a guidance strategy for EU policy.

Leaders: DGPR, DGS

Partners: Anses, INERIS, DGS

Action monitoring indicator: modification of REACH regulation

Action No. 71: support the initiatives detailed in the European Union’s 7th environmental action programme, regarding emerging risks, notably chemical risks and cocktail effects

Leaders: DGPR, CGDD-DRI

Partners: Anses, INERIS, DGS

Action performance indicator: -

Action No. 72: propose to stakeholders, within the PST3 framework, to extend to the European level, under Regulation No. 1272/2008 known as “CLP”, requests for a harmonised regulatory classification of manufactured nanomaterial families for which a substantial body of evidence exists detailing their nature as CMR and sensitizers. This classification would notably allow the labelling of product contents and ensure the traceability of these nanomaterials

Leader: DGT:

Partners: Anses, DGS

Action monitoring indicator: number of requests submitted, number of requests taken into account

2.6.2 Improve knowledge in traceability and exposure to nanomaterials and carry out research on the links between health and nanomaterials by encouraging multidisciplinary approaches.

Nanosciences are the subject of an intense research and innovation effort. In France, different research and development investments have been specifically assigned to this sector. However, this growing market remains poorly understood, and assessment of the potential risks is still very incomplete. Very many parameters are invoked in the toxicity mechanisms of nanomaterials. A key element of research in toxicology is the identification of one or more determining factors in the various biological models. Indeed, the methodology employed in the funded research is essential to contribute to building a body of reliable and comparable knowledge, as Anses emphasised in its notification of 15th May 2014 that provided a synthesis of current knowledge on nanomaterials and the stakes involved.

Because of their size and structure, these particles raise new, as yet unresolved, questions concerning their mechanisms of action. In general, substance property assessment is the responsibility of manufacturers and they should provide precisions on how REACH is taken into account at a European Union level.

Some European regulations require nanomaterials to be labelled, as for foodstuffs, cosmetics and biocidal products for example, in order to inform consumers of the presence of nanomaterials, and thus, allow them to make their own choices regarding the uncertainty linked to these substances. This labelling requirement should be generalised to include all chemical products containing nanomaterials.

More systematically, **France has implemented an obligatory declaration scheme for nanomaterials.** The first declaration campaign, in 2013 (concerning substances manufactured, distributed or imported in 2012), gave rise to a report that was made public in November 2013. The regulation also requires more detailed data to be made available to several expert bodies, each with their own area of expertise.

Public expertise thus remains necessary as a complement, considering the diversity of uses and concerns expressed. The efforts should prioritise the harmonisation of methodologies used by research teams in order to contribute to building a body of reliable and comparable knowledge for assessing health risks. This work requires a better characterisation of the exposure of the population to these substances.

As regards metrology for example, it is **the development of harmonised measurement devices and methods is needed in order to obtain a precise characterisation, lower detection limits and develop normative systems of concentrations, indicators of biological activity limits and reference nanomaterials.** For this purpose, bodies contributing to research orientation and funding could encourage methodological and

metrological work on nanomaterials and set a high methodological standard for funded projects in the field of nanomaterials and nanotechnologies.

As concerns workplace exposure, a cohort of monitoring procedures of workers at risk of exposure to nanomaterials has been implemented by the French Institute for Public Health Surveillance (InVS). Close monitoring of this type of study should be encouraged by the government. This work requires a better characterisation of the exposure of the population to these substances. Toxicity studies should focus on the long-term effects of low-dose chronic exposure.

Action No. 73: launch a measurement campaign of nanomaterials outside manufacturing sites and, depending on the results, ensure health agency intervention in order to define the limit values in these locations.

Leaders: DGPR, DGT

Partners: INERIS, Anses, DGS

Action monitoring indicator: progress rate of the measurement campaign

Action No. 74: study the fate of nanomaterials, with a life-cycle approach including ageing and “waste” phase and acquire knowledge concerning industrial waste from nanomaterial manufacture and waste containing nanomaterials

Leader: DGPR

Partners: INERIS, ADEME

Action monitoring indicator: release of a report on ageing and “waste” phase of materials containing nano substances.

Action No. 75: characterise the dangers of the most common low-dose, chronic exposure, nanomaterials in particular, in support of the development of adapted management methods and monitoring in the environment

Leader: DGPR

Partners: DGS, DGT, Anses, INERIS, CGDD-DRI

Means of action indicator: establishment of a research platform at INERIS

2.6.3 Enhance knowledge of radio frequency exposure and implement the recommendations of the Operational Committee on Mobile Telephone Waves (COPIC).

The development of technologies using electromagnetic waves has increased dramatically in the last 20 years. These new technologies are likely to increase the exposure of the general public and users which raises many questions and concerns, notably about the potential impact on health.

For example, **electromagnetic fields emitted from relay antennae are readily perceived as a pollution**, at higher than average levels of exposure (and indeed even at very weak exposures - as COPIC's work has shown) or when specific members of the public (notably children) are concerned.

Scientific uncertainty on this subject requires vigilance and monitoring, alongside the pursuit of information transparency and restraint in terms of emissions of electromagnetic waves.

For the record, the waves COPIC made recommendations on the local consultation and information phase, the key elements are as follows:

- **Make obligatory written contact of the operators with the mayor from the site research phase;**
- **Make obligatory the submission to the town hall of an information document on all relay antennae projects or any substantial modification by the operator**, one month ahead of the submission of a planning application, a time frame that can be extended to two months upon written request by the mayor;
- **Generalise the departmental consultation bodies presided by the department prefect, which then become mediation bodies;**
- **Systematically inform the residents of a building of plans for the installation of a mobile telephone relay antenna**, at least 15 days before installation of the antenna.
- **Expand requirements for data provision from operators within the framework of a Comsis document to be submitted to ANFR and an information document submitted to the mayor (power, antenna diagram, tilt, azimuth etc.).**

Action No. 76: collect and make publicly available data concerning exposure to electromagnetic radio frequency waves

Leaders: DGPR, DGS

Partners: ANFR, Anses, INERIS

Action monitoring indicator: number of measures carried out.

Action No. 77: identify any potential atypical aspects in the framework of the electromagnetic waves (radio frequencies) measurement campaign

Leaders: DGPR, DGS

Partner: ANFR

Action monitoring indicator: number of atypical aspects identified

Action No. 78: carry out scientific research on the risks linked to radio frequency electromagnetic waves via Anses' specific call for projects

Leaders: CGDD-DRI, DGPR

Partners: Anses, DGS

Action monitoring indicator: number of projects supported, budget raised for this end

2.6.4 Enhance knowledge and reduce riparian exposure to electromagnetic waves from HT and VHT power lines.

France has the highest and very high tension (+ 50 kV and + 200 kV) power networks in Europe. Electricity distribution is recognised as an essential public service. The Electricity Transport Network (RTE) possesses a geographical information system service that indicates the location of all HTL poles (or pylons) and all line sections. This data is continuously updated. Exposure to extremely low frequency electromagnetic fields (ELF-EMF) which are **non-ionising radiations has been the subject of a large amount of research**, which led CIRC to **class in 2001 exposure to magnetic fields of 0.4 μ T or more as "possibly carcinogenic to humans" (2B) for child leukaemias.**

Action No. 79: commission and make publicly available representative measurements of (extremely low frequency) electromagnetic fields from electricity transportation works

Leaders: DGPR, DGS, DGEC

Partners: RTE, Anses

Action monitoring indicator: number of measures carried out, on-line publication of results, number of information actions aimed at the general public.

Action No. 80: produce an indicator of exposure to extremely low frequency electromagnetic fields linked to proximity to high-voltage power lines.

Leaders: DGPR, DGEC

Partners: RTE, DGS, Anses

Means of action indicator: definition of the index.

3. Research in health and environment

Objective of this third part:
The two preceding parts have shown that very important issues in research must still be addressed in terms of health-environment in order to enhance our knowledge and guide our actions.
While specific and targeted research subjects have been planned and developed in these first two parts, the research actions remain nevertheless indispensable and should be structured.
That is the objective of this third part:

The subject of health-environment lies at the heart of the key issues defined by the government in their National Health and Ecological Transition Strategy. As regards research, in response to a sharp increase in societal expectations, numerous studies have been completed or are on-going, both internationally and in France, that seek to assess the impact of the environment, in the broadest sense of the word, on human health. The "Health-Environment" field appears in both the Health and the Environment Challenges of the National Research Strategy.

3.1. Explore the key challenges in the Health-Environment field by organising multidisciplinary research

New paradigms in the steering of public health environment policies have led to the introduction of new prevention and precaution measures. However, these need to be backed up by an unprecedented research effort. Just as current public health measures are based on past innovative research, as can be illustrated for example with endocrine disrupters, the actions of on-going research will allow us to define the prevention and precaution measures to be implemented in the short, medium and long term.

The PNSE3 has arrived at a turning point for scientific disciplines in the health-environment domain. In effect, this plan is based on several notions that require a substantial research effort, although they can already be translated into practical measures. This is the case for the exposome research. This requires the establishment of methodological bases for exploration and application, the integration of risk factors (chemical, physical, psycho-social, etc.) in the assessment of health effects, improvements in predictive capacities in toxicology and eco-toxicology, work on the relationship between human health and that of ecosystems, follow-up and monitoring of the environment regarding potential contaminants and bioavailability, and finally, detailed analysis of all kinds of vulnerability. Indeed, the integration of Human and Social Science (HSS) research is proving indispensable, notably to study the process that links information, cognition and decisions taken by both public powers and citizens. Research combining experimental sciences, economics, social sciences and human sciences allows for a better exploration of the costs of action and inaction, and of adaptation strategies and resilience.

These different themes found in the National Research Strategy should benefit from **intensive multidisciplinary research on a basic level as well as on a more applied one.**

These challenges play out at a European and international scale and the organisation of research in France should facilitate this international opening so that the country can take on an active leadership role.

These directions are also at the heart of proposals made by the Aviesan, Allenvi and Athena research alliances within the framework of the French Initiative on Research in Environment and Health (IFRES). IFRES has detailed the different research directions to be taken to support the proposals in the plan and thus construct a research base on which the PNSE3 can be based. This document proposes a flexible organisation of research in the environment-health domain which should allow us to meet the current challenges. It lists the national and international funding sources that could support this effort.

The alliances could be mobilised to develop interdisciplinary research on the links between health and biodiversity.

Action No. 81: co-ordinate and structure the research with the support of the French Initiative for Health-Environment Research

Leaders: DGRI, Aviesan, Allenvi, Athena alliances

Partners: DGPR, DEB, CGDD-DRI, DGS, MAAF, INCA, Anses, INERIS, InVS

Action performance indicator: publication of the IFRES annual report by the inter-alliance group (which includes the number of health environment projects supported by the ANR); participation of French teams in European programmes.

3.2. Support and pursue research programmes

3.2.1 Endocrine disruptors

The objective of the National Research Programme on Endocrine Disruptors (created in 2005) **is to support basic and applied research endorsed by public action on questions raised by endocrine disruption.** Steered by the Ministry of Ecology and Sustainable Development, this programme has spearheaded dozens of scientific publications and important new discoveries.

Action No. 82: sustain and support the National Research Programme on Endocrine Disruptors (PNRPE)

Leaders: CGDD-DRI, DGPR

Partners: -

Action monitoring indicator: number of projects supported by PNRPE.

3.2.2 Air Quality

Primequal, an inter-organisational research programme to improve air quality at a local level, is a research programme on air quality. It was launched in 1995. **This programme, steered by the Ministry of Ecology and Ademe, provides scientific bases and the necessary tools for decision-makers and environment managers to monitor and improve interior and exterior air quality** in order to reduce the risks for health and the environment. The programme worked on all issues associated with air quality: interior, exterior, long-distance pollution, proximity pollution, air quality and agriculture, **air quality and transport, etc.** **The objective of the call for AACT-AIR projects managed by ADEME** is to help regional and local authorities implement actions to improve interior and exterior air quality. The objective is to initiate, encourage and achieve regional actions that provide improvements in air quality and a reduction in greenhouse gas emissions.

The **CORTEA** objective, driven by Ademe, is to promote the emergence of innovative technical solutions to reduce or avoid emissions of pollutants and their precursors in the agriculture, construction, industry and transport sectors.

Action No. 83: support and sustain PRIMEQUAL, AACT AIR and CORTEA research programmes

Leaders: CGDD-DRI, ADEME

Partners: DGEC, DGPR, DGS

Action monitoring indicator: number of projects supported.

3.2.3 Soil management

In 1998, in response to the growing pressure humans are putting on soils, **the Ministry of Ecology founded the GESSOL (“Environmental functions and management of soil assets”) research programme.** The objective of this programme is to structure a soil management research community so as to provide public decision-makers and soil users with knowledge and operational tools to assess, monitor, manage, even improve soil quality, in natural, agricultural and urban soils.

Action No. 84: launch a call for research projects on environmental soil contamination with an impact on health

Leaders: CGDD-DRI, DGRI

Partners: ANR, ADEME

Action monitoring indicator: promotion and transfer of the results of funded research projects

3.2.4 Pesticides and health

Research on the effects of pesticides on health is very important. Studies have already confirmed the **specific toxicity of some of these products or of specific exposures**. Following a referral from the Health Minister, **Inserm made public in June 2013 the results of a collective expertise on health risks associated with exposure to pesticides**. This **synthesis took stock of available scientific knowledge on the relationship between the onset of certain pathologies and exposure to pesticides, particularly in the agricultural sector, and on the effects of early exposure on fetuses and young children**.

Action No. 85: increase research efforts on the effect of pesticides on health, on both the general population and professionals (toxicology, epidemiology, etc.), with an emphasis on mechanistic research (transgenerational effects and epigenetic mechanisms, effects of weak doses and mixtures)

Leader: MAAF/SG

Partners: Anses, DGT, DGS, DGOM, CGDD-DRI

Action monitoring indicator: number and total amount of projects supported by the PNREST and PESTICIDES programmes, number of research teams participating in these projects.

Determining a toxic effect in the laboratory, for example on cellular cultures, does not allow us to draw solid conclusions on the effect at a human level. To bridge this gap, we must be able to **design experiments that allow the combined effects of toxic substances to be measured under contained conditions at a sufficiently complex level of biological organisation to be able to integrate the existing interactions and regulations**. The intermediary-level experimental approach by mesocosm, between the laboratory and natural conditions on one hand, and between the individual and the population on the other, allows a distance from the multi-factorial dimension on the ground and an easier examination of a whole series of factors using non-invasive techniques. The use of aquatic mesocosms and the **realisation of a terrestrial mesocosm, reproducing the exposure conditions of wild species, will be of value in reproducing conditions of exposure to a mix of substances**. This tool will allow measurement in model species of the combined effects of pathogenic agents, including phytopharmaceutical products.

Action No. 86: broaden knowledge on the toxicity of mixed pesticides by experiments on model vertebrates or invertebrates

Leaders: CGDD-DRI, DEB, DGAL

Partners: -

Action performance indicators: realisation of a terrestrial mesocosm and exposure/effects results on vertebrates; use of aquatic mesocosms.

3.2.5 Nanomaterials

Nanosciences are the subject of an intense research and innovation effort. In France, different research and development investments have been specifically assigned to this sector. However, this growing market remains poorly understood, and assessment of the potential risks is still very incomplete. Very many parameters are invoked in the toxicity mechanisms of nanomaterials. A key element of research in toxicology is the identification of one or more determining factors in the various biological models. Indeed, the methodology employed in the funded research is essential to contribute to building a body of reliable and comparable knowledge, as Anses emphasised in its notification of 15th May 2014 that provided a synthesis of current knowledge on nanomaterials and the stakes involved.

As regards metrology for example, it is **the development of harmonised measurement devices and methods is needed in order to obtain a precise characterisation, lower detection limits and develop normative systems of concentrations, indicators of biological activity limits and reference nanomaterials.** For this purpose, bodies contributing to research orientation and funding could encourage methodological and metrological work on nanomaterials and set a high methodological standard for funded projects in the field of nanomaterials and nanotechnologies.

Action No. 87: define as ANR action priorities under challenges 1, 4 and 5, research focusing on methodologies including metrology and in situ traceability of substances in nanoparticulate state in environments and consumption products, as well as their action mechanisms.

Leader: ANR, DGRI

Partners: DGPR, DGS, DGRI, CGDD-DRI, LNE, INSERM, CNRS, CEA, ADEME

Action monitoring indicator: number of research projects funded

3.2.6 Health and biodiversity

Without limiting the links between health and biodiversity to the issue of services, we can define **two distinct categories of regulation services performed by biodiversity: on one hand, those that have a diluting effect on pathogens and, on the other, those that have**

a positive effect on well-being and fitness. The following developments cover aspects relating to the two categories of service - regulation services and services of a social nature. The relationship between biodiversity, green spaces and the direct benefits for populations is a subject that remains insufficiently explored. The scientific literature on the subject is primarily Anglo-Saxon. It reveals undeniably positive relationships between "green infrastructures and spaces" and benefits for the inhabitants.

One of the most commonly proposed explanations of the relationship between the volume of green space, well-being and health is that **the existence of "nature spaces" in their near environment could lead people to spend more time outside and in consequence partake in more physical activity.**

However, objective quantification of the positive beneficial effects of a green infrastructure on health remains to be done, notably regarding therapeutic gardens. Even when the accumulation of different elements of the relationships between the components of green infrastructure and health is taken into account, the cause-effect relationships are not easily established, with the exception of the effects of revegetation on local temperatures. Even studies that best control for socio-economic factors cannot integrate all the personal, temporal and cultural factors that affect human health.

Action No. 88: establish a collective expertise on the beneficial effects of biodiversity in disease prevention and control

Several international scientific publications demonstrate the barrier effect or dilution effect that biodiversity performs on pathogenic agents (bacteria, viruses, parasites). Similar studies highlight **the importance of biological system resilience to prevent disease development.** The objective here is to carry out an assessment of current knowledge and identify, for France, the most promising directions in terms of using biodiversity in preventing and controlling diseases.

Leaders: DEB, DGRI, CGDD-DRI

Partners: Anses, IRSTEA, INRA, CNRS, FRB, CSPNB

Action performance indicator: collective expertise report.

Action No. 89: establish a collective expertise on the positive effects of urban green spaces and nature spaces on health

Leaders: DGALN, CGDD-DRI

Partners: CGDD-DRI, IRSTEA, CEREMA, CSPNB

Action performance indicator: collective expertise report.

Our health depends on the living world and is directly linked to that of the biodiversity around us. Thus, knowledge of the role of environmental modifications in pathogen dynamics and in disease development is essential.

Infectious diseases are spreading, many of these are caused by pathogenic agents passed to humans from animals.

Indeed, some more sensitive species can act as “sentinels” for the development of some pathologies. As such, they could be subject to adapted surveillance.

Action No. 90: support research programmes at the interface between ecosystems and health in ANR or MEDDE programmes

Human populations and ecosystems are exposed to multiples stresses - physical, biological and chemical. **The disturbance of an ecosystem by human actions can directly or indirectly create favourable conditions for disease development.** Knowledge of the role of environmental modifications in pathogen dynamics and in disease development is essential. Research in this domain must be supported and identified in the alliances' diagnoses (AllEnvi, Athéna & Aviesan - French Initiative for Environment Health Research)

Leaders: DGRI, CGDD-DRI

Partners: DEB, ANR, Allenvi, Athena, Aviesan

Action monitoring indicator: number and total amount of research projects supported by ANR and the MEDDE research programmes

4. Strengthen the health-environment dynamic in the regions, information, communication and training

Objective of this fourth part:

The theme of health-environment is at the heart of citizens' concerns. Citizens and their regions are also the most important actors. A balanced action strategy should thus also rely on a dynamic in the regions, by mobilising diverse tools and complementary categories of actors. That is the objective of this fourth part:

To reinforce the health-environment dynamic in the regions, **the PNSE 3 should allow consolidation of the progress already made in ten years of actions (PNSE1 and 2) but it should also offer a new approach to environmental health that is stronger and has closer ties to the regions.** One important requirement is to **provide local actors with tools and methods that allow them to implement, in a measurable way, concrete actions adapted to the specific health-environment issues and challenges of their region.**

Over the next period 2015-2019, in the context of a twofold (ecological and epidemiological) transition taking place in our society, we must act to create an environment favourable to the health of all.

The national ecological transition and sustainable development strategy explicitly refers to health stakes as one of its priorities Thus it converges with the national health strategy. Both are working towards the two aims of environmental quality and reduction in health inequality. This new framework should promote advances in reflection on health-environment and regional action.

The 4th focus of this plan is to reinforce the health-environment dynamic in the regions, it is built around 4 priorities:

- **Facilitate the enactment of the PNSE with respect to the local priorities defined in the PRSEs and improve progress monitoring.**
- **Promote the participation of local populations in decisions linked to health-environment**
- **Introduce support tools for populations subject to overlapping environmental exposures.**
- **Continue efforts in education, training and information in health-environment**

4.1. Promote and support local health-environment initiatives in keeping with the PNSE

Assessments of previous PNSEs and PRSEs show that beyond national action priorities, it is also indispensable to better define the local conditions in which these priorities are implemented.

These assessments highlighted the difficulties faced, such as changes in the local actors operating over the last decade, future changes in regional organisation and the introduction of regional health public services. All these factors should be taken into consideration.

In this evolving landscape, it is crucial to **promote actions based on multi-sector and multi-partner approaches**. Regional implementation of the PNSE, via the PRSEs, is carried out by regional health environment groups (GRSE), made up of representatives of all the stakeholders, distributed across **6 sectors: State (including public agencies and establishments), regional authorities, associations, employees, employers and representatives from the economic world, qualified individuals.**

Action No. 91: organise implementation of PNSE as PRSE

It is useful to provide precisions on several points:

- **The time period between the PNSE publication and its regional implementation as a PRSE**
- **Establishment of PRSE continuity: the new PNSE** results in a revision of the old PRSE, by integrating newly obligatory actions and retaining non-finished existing actions.
- **Methods of taking other regional and infra-regional plans into account and assessing regional dynamics to improve local co-ordination.**
- **Developments in the PRSE** in order to account for swift context changes, the actions of future PNSEs and, in general, any action deemed appropriate during the life of the plan.
- **Role of GRSE and other PRSE governing bodies**
- **Validation of PRSE by local bodies**

Leaders: DGPR, DGS

Partners: DGESCO, DGPAAT, DGT, DHUP, Regional prefects, ARS, GRSE, regional councils

Action performance indicators: publication of the national policy; number of PRSEs published within the set deadline.

Action No. 92: introduce monitoring tools for the conception and implementation of PRSEs

The introduction of common monitoring tools for the PRSEs will allow them to be better managed at local and national levels. The new PNSE notably integrates performance indicators for each action, indicators that the regions can use directly. Additionally, the policy set out in the previous action can include other steering tools if appropriate.

The tools to be made available should include as a minimum:

- **A methodology guide** to progressive and on-going drafting and revision of the PRSEs
- **Harmonised indicators for all regions** (notably for the obligatory PNSE actions)
- **Monitoring documents and a database** to ensure information on PRSE progress statuses is passed on.
- **A collaborative platform** allowing documents to be shared and discussions to take place.

Leaders: DGPR, DGS

Partners: DGESCO, DGPAAT, DGT, Regional prefects, ARS, GRSE, regional councils

Action performance indicator: Availability of tools; number of PRSEs using the tools; percentage of plan monitoring indicators provided in the tools

Action No. 93: encourage communication between administrations (state or regional) of the same region, between the regions themselves and between the regions and national government

In order to avoid isolating the PRSEs, **inter-regional meetings between the main leaders of these plans will be organised, at least once a year.** These meetings will facilitate communication of best practices, as well as difficulties faced, on subjects such as steering, assessment, infra-regional implementation of health-environment themes, diagnoses and tools for preventing and controlling regional, environmental and social health inequalities. A meeting rapporteur will be responsible for providing a summary of both the positive and negative points raised during the meetings, and will then transmit this synthesis to the national government.

Equally, intra-regional meeting initiatives will be encouraged.

Leaders: DGPR, DGS

Partners: DGESCO, DGPAAT, DGT, Regional prefects, regional councils, GRSE, ORS, ARS, DREAL, DJRCS, DIRECCTE, CEREMA, CGDD

Action monitoring indicator: number of inter-regional meetings organised per year, number of intra-regional meetings organised per year, participation percentage of regions at annual meetings

4.2. Host public debates and promote health democracy in health-environment issues

The need for participation today is based on several agreements: **The Aarhus Convention, the Environment Charter, the Bangkok Charter for Health Promotion adopted by the WHO in 2005, which promotes empowerment¹ and the individual capacity to act. Health democracy is an approach that aims to bring all the actors in the health system together to conceive and implement health policies, in the spirit of dialogue and consultation.** For health democracy to work, intervention is required at all levels to develop consultation processes and public debates, to raise health actor participation and to promote the individual and collective rights of the users. It is an essential part of strategic governance. Each region has developed health democracy tools. In some regions, it has become a top political priority.

Action No. 94: Promote participation of the population in decisions linked to health-environment

In the field of environmental health, discussion sessions and/or public consultations exist. They are not however real diagnostic tools shared with the populations concerned. The first action aims to introduce in France experiments with a method called "community diagnosis", originating in Belgium (1998), and implemented in several countries including Belgium and Canada. This method aims to introduce a local dynamic to identify and involve the most vulnerable populations, within the framework of a regional vulnerability diagnosis.

Before the action and before implementing or modifying health environment activities in a given community, sufficiently detailed information should be gathered of the problems of said community: information on the ins and outs of these problems, their historical and cultural origins, how they are presented and perceived by the population, their aspirations in terms of health, quality of life and their needs.

We should also thoroughly understand what (professional, material or human) resources are available in the community and the actors present.

Leaders: DGPR, DGS, DGRI

Partners: Prefects, regional authorities, ORS

¹ Granting more power to individuals or groups to act on the social, economic, political or ecological conditions that affect them.⁴

Action performance indicators number of research-action programmes allowing community diagnosis application criteria to be defined, drafting of a reference document for the implementation of these diagnoses.

4.3. Promoting consideration of health-environment issues in the local implementation of public policies.

4.3.1 Promote the integration of health-environment issues in local policies

All public policies can directly or indirectly affect the health and well-being of populations A certain number of local action programmes (notably in the domains of urban planning, transport and mobility, habitat, agriculture, waste, water, biodiversity, environment and access to essential services), carried out by towns and agglomerations, can have an effect on the health environment of the population: Agenda 21, the regional climate and energy plan, local town planning, eco-neighbourhoods, pesticide reduction plans for the agglomeration, the local risk and pollution prevention plan, sustainable public procurement, the local habitat and natural spaces programme, etc. Care-taking on a regional level, involves **conceiving policies in relation to populations** (e.g. habitat/transport and ageing). In this sense, a prevention ecosystem remains to be built, as does the definition of the social and economic cost of non-prevention.

A proactive policy should be encouraged that takes health environment into account and aims to promote an environment favourable to the health and quality of life of the inhabitants, though, for example, local initiatives in Environmental Health (ILASE). These initiatives can themselves be part of already existing local action plans (notably in Public Health) in the field of health determinants, alongside other priorities such as nutrition or addiction. The idea is to look, in each of the local authority's public policies, at what favours, or does not favour, health and to instigate levers for improvement. A balance needs to be found between actions on actual physical places and actions on behaviour.

Town councils and inter-municipality associations have a legitimate mandate to act in areas of health-environment, wherever the daily life and quality of life of the inhabitants are affected.

Action No. 95: promote Local Action Initiatives in Environmental Health (ILASE) and other environmental health actions at municipal and inter-municipal levels.

This promotion will focus on introducing a label for these initiatives, on developing a participation charter in the PRSEs, and on making available experience feedback on methodologies as well as on actions implemented. Integrating regional authorities in the GRSE is thus essential.

Leaders: DGS, DGPR

Partners: Regional prefects, regional state services, ARS, regional councils

Action monitoring indicator: number of initiatives labelled as PRSE.

Action No. 96: introduce in willing regions a call for collaborative DREAL/ARS/regional council projects in order to fund local health-environment initiatives

These initiatives can be carried out by different types of structures (associations, local authorities etc.)

Leaders: DGS, DGPR

Partners: Regional prefects, DREAL, ARS, regional councils

Action performance indicators number of projects/initiatives funded by the call for collaborative projects, national budget allocated to this call for projects.

4.3.2 Better integration of health environment issues in urban planning and development.

A cross-cutting approach between the different actors responsible for regional planning and health is required, but currently remains very underdeveloped. Yet, recent regulatory developments, notably regarding obligations to undertake environmental assessments for all new policies, urban plans or projects (subject to the opinion of the environmental authority), constitutes a dynamic and favourable context for promoting a shared culture integrating health and environment, including biodiversity, into urban planning decisions.

This action will be implemented in line with Action 1 of the transport roadmap in the annex.

Action No. 97: voluntary testing of the implementation of some health impact studies at neighbourhood level allowing optimal integration of health and environmental issues

Leader: DGS

Partner: DHUP

Action monitoring indicators: number of guides drawn up, training sessions, conferences and forums organised, and publications released

Action No. 98: develop tools to be used by all actors allowing the integration of health into planning projects and documents, using a holistic approach to include all the determinants (economic, environmental and social)

Leaders: DGCL, DHUP DGS

Partners: DHUP, DGITM, INERIS, FNAU, WHO town-health network, foreign institutes with experience in the domain, EHESP, ADEME

Action performance indicators number of guides drawn up, training sessions, conferences and forums organised, and publications released

Action No. 99: develop information distribution systems to ensure that greater account is taken of air quality and its health impacts, notably on vulnerable people (young children etc.), in urban planning projects (nurseries and schools near roads with heavy traffic flow), so that the State is adequately informed during the drafting of urban planning documents.

Leaders: DGS, joint leader DGCS

Partners: Anses, AASQA, LCSQA, EHESP, DGESCO, DGEC, DGALN (DHUP)

Action performance indicators Anses referral, introduction of tools and local experiments

Action No. 100: giving municipalities and inter-municipalities the power to introduce traffic restriction zones in their areas

The basic principle is to **define the conditions in which traffic in these zones can be restricted to less polluting vehicles** in order to combat this pollution and reduce emissions of particulates and nitrogen oxide in particular. Particular attention is put on defining **geographical perimeters, time periods and vehicles targeted with reference to the classification detailed in Article L318-1 of the highway code.**

Leader: DGEC

Partners: local authorities with the power to introduce such zones, AASQA

Action performance indicators: number of local by-laws (in other words, number of restriction zones)

4.3.3 Support equal access to drinking water and sanitation

Promote the tools of the Protocol on Water and Health in the framework of political involvement in promoting equal access to water and sanitation. Encourage use of these tools by authorities and water and sanitation service providers. Define and implement specific action plans in the PRSEs. Promote awareness among decision-makers and operators of equity issues as regards access to drinking water and sanitation. This theme should be taken particularly seriously in overseas departments.

On the occasion of the **3rd meeting of Parties to the Protocol on Water and Health, in November 2013 in Oslo** (Norway) where WHO Europe and the United Nations Economic Commission for Europe (UNECE) assumed the secretariat, the States parties and signatory international organisations welcomed **France's involvement on the subject of equal access to water and sanitation in which the country has been a leading player since 2007**. This action is part of the focus on the theme of water, a strong advocacy point for France in diplomatic and technical terms. For example, the country lobbied to include the right to water and sanitation in the United Nations texts and notably in the future "post 2015" global development goals; it also hosted the 6th World Water Forum in March 2012 in Marseille. In this vein, the Health Minister, during his last mandate on the WHO Executive Council (2009-2012), proposed the adoption of the resolution, "Drinking-water, sanitation and health" (Resolution WHA64.24 adopted at WHA 2011). At a national level, various possibilities were identified for particular focus and still need to be developed. In 2013, the City of Paris and its Water for Paris delegate acted to **implement at a local level the good practices defined in the Protocol. This experience led to an expansion of the measures, and from 2014 onwards, other local authorities began promoting the Protocol tools**. These were implemented through France's support for the regional health and environment plans (PRSE), some municipalities having already come out in favour. These initiatives aim to **reinforce water rights as desired by the National Water Council and members of parliament**. For this purpose, the definition and deployment of specific action plans can be prioritised at a local level, as can awareness raising among decision-makers and operators of equity issues as regards access to drinking water and sanitation.

Among the official documents of the Protocol which constitute tools for ensuring equal access to water and sanitation, prominence is given to the best practice guide entitled, "No one left out" which was presented during the 6th World Water Forum in 2012 in Marseille, and also to the self-assessment tool, prefaced in 2013 by the Health Minister, for public policies addressing equal access to water and sanitation.

Action No. 101: support equal access to drinking water and sanitation

Leaders: DGS, DEB, DGOM

Partners: ARS, DREAL, Prefects/DDT, associations

Means of action indicator: number of PRSEs integrating these specific actions on equal access to water and sanitation

4.3.4 Improving the noise environment

Opinions surveys confirm that **two out of three French people say they are bothered by noise at home**. The exposure levels of environmental noise, such as that measured near transport infrastructure, have significant health consequences.

Action No. 102: for the construction of nurseries, promote processes that assess support tools for acoustic performance and propose, where appropriate, acoustic recommendations to improve noise levels

Leaders: DGCS, DGS

Partners: DGPR, DHUP, CNB

Action performance indicators recommendations followed.

Action No. 103: draft a statement detailing best practices in order to better protect the population from auditive risks, notably when listening to loud music.

Leaders: DGS, INPES (national level), ARS (regional level)

Partners: DGESCO, DGSIP, associations, health insurers, Ministry of Culture

Action performance indicators: number of information campaigns achieved; number of PRSE3s taking up the action

4.4. Reinforce information, communication and training

Dating back to the first PNSE, informing and training actors and certain specific bridging populations on health and land-use planning was identified as a priority. The actions undertaken were pursued within the framework of the second PNSE. During the National Health and Environment Meeting held in Lyon in June 2013, a workshop took place on "Communicating to engage in health and environment issues; what experience and efficacy?" This clearly demonstrated the need to work on the aims of training, informing, awareness-building in the field of health linked to the environment: information on the subject is complex, technical and sometimes contradictory; decision-makers' concerns are not always those prioritised by the general public; uncertainty in scientific knowledge can lead to suspicion and anxiety; the public is diverse and it is difficult to adapt to this diversity; the material and human means are greatly lacking.

In response to these observations, some steps were proposed:

Prioritise simple positive messages based on daily life; define target populations and adapt the message to them; pay attention to the credibility of these messages; adapt

the themes launched by national agencies to the needs of regions and municipalities; prioritise participative approaches for long-term support; encourage critical thinking and autonomy in the public; work on message repetition; build awareness amongst young people and school pupils.

These discussions also touched on tools and methods of disseminating information, including the use of social networks.

The mission of the third PNSE is to assess the very many initiatives put in place (initiatives aimed at doctors, post-graduate programmes on health-environment-work, the Green Plan in higher education with its challenge 7, developments in teaching programmes to integrate education on health, risks and sustainable development, and finally, actions involving educators in the environment) and to continue the efforts to train bridging populations as well as raising awareness in the general public and providing them with information.

The work should include data collection, analysis and validation for existing tools and the development of new tools, based on new technologies in particular.

Action No. 104: undertake detailed analysis of both initial and continuous training programmes for bridging populations targeted in the PNSE1 and PNSE2 and complete existing provisions

The public concerned in particular are health professionals (interns in public health, future gynaecologists, nurses etc.), agricultural professionals, teachers, architects, urban planners, engineers (of buildings, heating, public works etc.), etc.

Leaders: DGESCO, DGER, DGESIP, DGEFP

Partners: inspections (IGAENR, etc.), National University Council sectors, French Commission of Engineer Titles (*Commission des Titres d'Ingénieurs*), regional councils

Action monitoring indicators: number of times health-environment is taken into account in pedagogic tool-kits, number of training programmes modified

Action No. 105: pool regional experiences of initial and continuous health-environment training

The public concerned in particular are health professionals, agricultural professionals, building and heating engineers (in particular in IAQ, asbestos, noise and radon), public workers, teachers and urban planners etc.

The existing training networks will be identified, following the example of the study carried out using the Rhône-Alpes PRSE2. This work will complement the survey carried out by EHESP on post-graduate training in environmental health.

Leaders: DGESCO, DGER, DGESIP, DGEFP

Partners: regional councils, EHESP

Action monitoring indicator: number of regional experiences surveyed.

Action No. 106: pursue efforts in health-environment education

This will **raise awareness and inform child pupils, from a young age and for the duration of their school life including high school, of health-environment issues within the context of sustainable development education and education and health studies** by proposing **reference tools** (teaching tools for those teaching directly, awareness-raising tools for others, suggestions on how to carry out these activities).

This action could begin by surveying the existing initiatives, and follow with support for new projects by making tools available, identifying the educators involved and providing the means for training them.

Leader: DGESCO

Partners: CNFPT, regional councils

Action performance indicators number of establishments that have introduced education programmes on health-environment

Action No. 107: facilitate informing all citizens on themes linked to health environment, notably by creating a meta-portal on the PNSE and PRSEs

Currently, information on the subject is fragmented and lacks centralisation. Indeed, too many financial and human resources, in relative terms, are allocated to gathering information, and too few are allocated to the interpretation of this information to understand what is taking place, to assessing actions to be implemented, to guiding actions and to informing the general public.

Coordination on a national level is thus necessary to create a single, shared service. Beyond national level information, which is indispensable in steering the PNSE3, this service should also be completed using local information bases.

In parallel, awareness-raising initiatives should be encouraged, notably amongst target populations (parents of school pupils, future parents, social workers, badly or non-informed populations, local authorities etc.). For example, associations working in this domain can usefully respond to the collaborative call for DREAL/ARS/regional council projects as defined in Part 4.3.1.

Leaders: DGS, DGPR

Partners: INERIS, regional state services, ARS, regional councils, associations

Action performance **indicator of action:** website launch, portal update frequency and monitoring of type and origin of information gathered, number of website hits and reader profiles

1 RGPP, creation of ARS, regional authority reform law of 16/12/2010, regional public action modernisation law of 27/01/2014

Annex: Ad Hoc Transportation Work Group Roadmap

Introduction

The PNSE 2 (2009-2013) contained several policy objectives in the transport domain that were integrated into the work group report, "Exposures responsible for pathologies with a strong impact on health". These were: improving the regulation of urban mobility by developing carsharing, carpooling and exclusive-lane public transport, developing river navigation and sea motorways, promoting active means of transport, improving user and transport worker health and comfort.

1. Work group sphere of activity

1.1 Responses to requests from the High Council for Public Health (HCSP) and general inspections

Among the 11 recommendations of the inspection mission for the future PNSE3, recommendation no. 4 proposed: "Dismissing complex actions that can stem from particular governance, such as those dedicated to the health-environment-transport issue, in favour of more specific plans, while conserving the link with the PNSE3."

The inspection mission also cited objectives set by the PEP (French: PPE TSE) for designing the PNSE3 transport measures.

The HCSP recommended in particular that the PNSE 3 adopts precise and quantified objectives, and devises a reduced set of relevant indicators.

The ad hoc transport group was created in response to these recommendations.

1.1.1 Coordination with other public health plans

Promoting active means of transport can be incorporated into **several national public health plans that encourage physical activity to prevent chronic pathologies** (cancers, obesity, cardiovascular pathologies, etc.) and can also form part of the care provided for some diseases. This applies notably to the PNNS and the Cancer Plan 3.

1.1.2 Link with the Transport, Health and Environment Pan-European Programme (THE PEP)

The PEP (French: PPE TSE) produced a **methodological guide for designing, implementing and monitoring national transport-environment-health plans**, which was considered in the work of the ad hoc transport group.

On the 15th April 2014, the Paris declaration was adopted, following the fourth high level meeting of the PEP involving representatives of the 56 Member States of this programme. **It contained five priority objectives for the period 2014 – 2020: economic development and employment, transport system efficiency, nuisance reduction (GHG, pollution,**

noise), measures supporting healthy and safe means of transport and coordination with regional and urban planning policies.

The ad hoc work group wholly subscribes to this approach.

1.1.3 Specific governance while conserving the link with the PNSE3

Each theme corresponds with several PNSE3 themes and integrates research, international and work aspects.

The ad hoc transport work group is made up of some members of the GSE and of other interested experts. The group functioned following the same principles as the PNSE3 transversal groups. Indeed, it presented its organisation modalities and its three thematic propositions at the PNSE3 COPIL and reported on the progress of its work at COPIL as well as at the PNSE3 CAS. It follows the set timetable for drafting the PNSE3.

1. 2 Coordination with other actions

1.2.1 The work of other networks of actors in health-environment

The interior air quality plan published by the government in October 2013 forms the basis of the interior air section of the PNSE3. For exterior air quality, the PNSE takes the CNA proposals into account.

1.2.2 Sectoral work

The group also took care to avoid duplicating existing specialised work frameworks, in particular the rail freight renewal conference, the national harbour renewal strategy, the rail network reform, the national conference on logistics, the ecological taxation committee, the national intelligent transport strategy and the inter-ministerial committee on air quality.

2. Literature overview of public action stakes

The group carried out a literature survey **on transport themes, including international publications** to identify the strengths and weaknesses to be investigated and the questions to submit to multidisciplinary and independent scientific expertise with the ultimate aim of helping decision-making. By examining the answers to these questions, we can transfer the knowledge gleaned (via guides, seminars, conferences, etc.) to a national, regional and even local level.

3. Areas of action identified

The group focused on three themes. The group was partly inspired by subjects addressed in the PNSE 2 but not yet completed, and partly by reflection undertaken elsewhere on ecological and energy transition, urban planning, regional planning, the silver economy, working conditions, etc.

3.1 Action 1: consideration of health-environment issues in regional planning documents relating to transport (of people and goods), urban planning and housing.

The operational objectives of this action are to **make an inventory of how transport-environment-health links are taken into consideration**, as detailed in the PNSE3 themes and in the local plans and models. Then, based on this inventory, propose directions to be taken and methodological tools to be used to improve consideration of these links in the relevant plans and models.

More precisely, the following steps are required:

- **Make an inventory of transport-environment-health links** in the main planning documents and local models as well as in the associated environmental assessments;
- **Make a concise inventory of objectives/actions present in all or part of the regional planning documents** that deal simultaneously with transport, environment and health. This inventory should also include governance actions identified and environmental assessments;
- **Identify factors that could facilitate or impede integration of PNSE and PRSE actions into these plans**, as well as their operational implementation;
- **Propose methodological tools and methods of governance permitting better integration of PNSE and PRSE objectives and actions into the regional thematic planning documents** (e.g.: PPP) or urban planning (in particular intercommunal Local Urbanism Plans that provide an overview on the area), information dissemination, public consultation methods and environmental assessments;
- **Make an inventory of the tools needed to assess health impacts at a regional level;**
- **Assess requirements in terms of tools and propose methodological tools and methods of governance to improve the consideration of these links in the relevant plans and models;**
- **Develop diagnostic tools covering the transport of people and goods;**
- **Development training/information/communication initiatives on these themes, aimed in particular at local elected representatives, transport users, health professionals and town planners;**
- **Encourage and promote local voluntary initiatives on sustainable town logistics** in line with the principles and objectives defined at a national level for sustainable urban logistic charters that are the result of the emergency air quality plan and demonstrate involvement of economic and regional actors in sustainable logistics issues.

Leader: DGITM

Partners: DGALN, ARS, EHESP, INSERM, project managers of regional planning documents, CNFPT, ADEME, CEREMA

Proposed action performance indicators: development of tools, methodologies and training/information/communication actions on these themes.

Schedule:

2014: inventory of planning documents

2015: summary of the list of recommendations

2016-2018: production of first methodological documents.

3. 2 Action 2: promote active means of transport, assess and quantify their effects on health and environment

Although the action fits into the PAMA framework, its aim is not to replace existing measures in the plan but to help their implementation. Complementary measures to those detailed in the plan can also be defined: a network approach to these means of transport and their integration in the transport system, the link with regional structures (urban planning that favours short distances, service density).

More precisely, the actions aim to:

- **Make an inventory of current knowledge on the effects on health and environment** of practising active means of transport (including French, European and international scientific publications covering experiments, risk-benefit studies, medico-economic approaches to urban organisation (urban planning that favours short distances, urban densification), walkability, cyclability, with a list of recommendations.
- **Bear in mind the existing legislative and regulatory framework** (infrastructures dedicated to cycling: parking places, dedicated lanes);
- **Assess the impacts of PAMA measures on health and ensure adherence to PAMA;**
- **Identify and promote best practices and make them known;**
- **Make the link between user risk-benefit assessments and the attractiveness of active means of transport;**
- **Draw up methodological guides: pedestrian and cycle plans;**
- **Inform people of the effects on health and environment.**

Leaders: CIDUV and DGITM, DGS

Partners: local actors, transport and health researchers (expertise from high-level, independent, multidisciplinary scientific research such as INSERM, Anses, EHES), regional organisations (ARS and DREAL), DSCR, CEREMA, ADEME

Proposed action performance indicators: Production of tools, methodologies, written works and communication initiatives on active means of transport; hearing of documents produced and actions carried out to promote active means of transport.

Schedule:

2014: inventory;

2015: summary;

2016-2018: methodological guides and communication initiatives.

3.3 Action 3: improve awareness of the impacts of the quality of daily transport on health (reliability, perceptions)

The aim of this action is **to establish and implement a programme to enhance knowledge on the impacts of the quality of transport services on health, taking into consideration attributes such as comfort, reliability, information and perception of situations of daily transport.**

More precisely, the actions aim to:

- **Make an inventory of current scientific knowledge;**
- **Examine the actions that can enable transferable assessments;**
- **Draw up a methodological document based on this inventory;**
- **Design a coordinated study and research programme;**
- **Train, inform and communicate using road accident data to discuss road safety. Develop a training programme for drivers that includes eco-driving to improve air quality.**

Leader: DGITM

Partners: transport and health research organisations (expertise from high-level, independent, multidisciplinary scientific expertise such as INSERM, Anses, EHESS), GART, UTP, FNTV, FNAUT, AQST, State and local road managers, AASQA, CEREMA, ADEME

Proposed indicators of action implementation: drafting of methodological documents; design of a coordinated study and research programme; highlighting of several action levers for transport actors.

Schedule:

2014: inventory of relevant references;

2015: summary;

2016-2018: drafting of methodological guides and design of coordinated study and research programme.

4. – Implementation and monitoring foreseen

The aim of the ad hoc work group, created to design a transport roadmap for the PNSE3, is to **evolve into a technical implementation and follow-up group responsible for monitoring the progress of the three actions**. All members of the work group are invited to participate in the implementation and follow-up group which could, if necessary, expand to include other members.

More precisely, this group will:

- **Be the driving force of these actions;**
- **Ensure, through regular meetings, that the work undertaken responds appropriately to the objectives defined in the action sheets;**
- **Support researchers in resolving difficulties that may arise during the work and bring together, as needed, the required experts;**
- **Take note of the study results;**
- **Validate the research by promoting the diffusion, appropriation and use of the results by the actors concerned.**

Glossary

AASQA: Association agréée de surveillance de la qualité de l'air / Licensed body for air quality surveillance

AMM: Autorisation de mise sur le marché/ Marketing authorisation

ANAH: Agence nationale de l'habitat/ National housing agency

APSF: Association professionnelle des sages femmes/ Professional midwife association

AQUAREF: Laboratoire national de référence pour la surveillance des milieux aquatiques/ National reference laboratory for aquatic environment monitoring

ARS: Agence régionale de santé/ Regional health agency

Anses: Agence nationale de sécurité sanitaire de l'environnement et du travail/ National Agency for Food, Environmental and Occupational Health Safety

ANR: Agence nationale pour la recherche / National research agency

CAF: Caisse d'allocation familiale / Family benefits fund

CEI: Conseiller en environnement intérieur / Interior environment advisor

CGDD: Commissariat Général au développement durable / General Commission on Sustainable Development

CIRC: Centre international de recherche sur le cancer / International centre for cancer research

CITEPA: Interprofessional technical centre for studies on atmospheric pollution

CMR: Substances Cancérigènes, mutagènes ou reprotoxiques / Chemicals classified as carcinogenic, mutagenic or toxic to reproduction

CNB: Conseil National du Bruit / National noise council

CO: carbon monoxide

COPIC: Comité opérationnel sur les ondes de téléphonie mobile / Operational committee on mobile telephone waves

COV / VOC Composés organiques volatils / volatile organic compounds

DBP: phtalate de dibutyle / dibutyl phthalate

DEB: Direction de l'eau et de la biodiversité / Water and biodiversity board

DIRECCTE: Direction régionale de l'Entreprise, de la Concurrence, de la Consommation, du Travail et de l'Emploi / Regional directorate for business, competition, consumption, labour and employment

DREAL: Direction régionale de l'environnement, de l'aménagement et du logement / Regional directorate for the environment, planning and housing

DGAL: Direction générale de l'alimentation / General directorate for food

DGCCRF: Direction générale de la consommation, de la concurrence, de la répression des fraudes / General directorate for consumption, competition and fraud prevention

DGCS: Direction générale de la cohésion sociale / General directorate for social cohesion

DGDDI: Direction générale des douanes et des droits indirects / General directorate for customs and excise

DGE: Direction générale des entreprises / General directorate for business

DGEFP: Direction générale à l'emploi et à la formation professionnelle / General directorate for employment and professional training

DGER: Direction générale de l'enseignement et de la recherche / General directorate for teaching and research

DGESCO: Direction générale de l'enseignement scolaire / General directorate for school teaching

DGESIP: Direction générale pour l'enseignement supérieur et l'insertion professionnelle / General directorate for higher education and professional integration

DGOM: Direction générale de l'outre mer / General directorate for overseas territories

DGPAAT: Direction générale des politiques agricoles, agroalimentaire et des territoires / General directorate for agricultural policies, food production and territories

DGPR: Direction générale de la prévention des risques / General directorate for risk prevention

DGRI: Direction générale de la recherche et de l'innovation / General directorate for research and innovation

DGS: Direction générale de la santé / General directorate for health

DGT: Direction générale du travail / General directorate for work

ELFE: Etude longitudinale française depuis l'enfance / French longitudinal study of children

ENNS: Etude nationale nutrition santé / National study of nutrition and health

ESTEBAN: Etude santé sur la biosurveillance, l'activité physique et la nutrition / Health study on biomonitoring, physical activity and nutrition

FDES: Fiche de données environnementales et sanitaires / Environmental and health statement

GRSE: Groupe régional santé environnement / Regional health environment group

GSE: Groupe santé environnement / Health environment group

HAP/PAH: Hydrocarbures aromatiques polycycliques / Polycyclic aromatic hydrocarbons

HCSP: Haut conseil de santé publique / High committee on public health

IGAENR: Inspection générale de l'administration, de l'éducation nationale et de la recherche / General inspection of administration, national education and research

INCa: National cancer institute

INERIS: Institut national de l'environnement industriel et des risques / National institute for industrial environment and risks

INPES: Institut national de prévention et d'éducation pour la santé / National institute for prevention and health education

INRS: Institut national de recherche et de sécurité pour la prévention des accidents du travail et des maladies professionnelles / National institute for research and security for the prevention of accidents at work and professional diseases

INSERM: Institut National de la santé et de la recherche médical / National institute for health and medical research

InVS: Institute for public health surveillance

MAAF: Ministère de l'agriculture, de l'agroalimentaire et de la forêt / Ministry of Agriculture, Food Production and Forestry

MSA: Mutual agricultural fund

NODU: indicateur global de suivi de l'intensité de l'usage des pesticides / treatment frequency index for monitoring the use of pesticides

NOx: Oxydes d'azote / Nitrogen oxide

ONEMA: Office national de l'eau et des milieux aquatiques / National office for water and aquatics

OMS/WHO: Organisation mondiale de la santé/World Health Organisation

ORP: Observatoire des résidus de pesticides / Observatory for pesticide residues

OSEO: Etablissement public destiné à soutenir la croissance et l'innovation des petites et moyennes entreprises / Public establishment to support growth and innovation of small and medium-sized business

PAMA: Plan d'action pour les mobilités actives/ Action plan for active means of transport

PANANC: Plan d'actions national sur l'assainissement collectif / National action plan for collective sanitation

PCB: polychlorobiphényles / polychlorinated biphenyls

PM 2.5 - PM 10: Particulate matter – of average size 2.5µm (PM 2.5) or 10µm (PM 10)

PNB: Point noir du bruit / Noise black spot

PNUD / UNDP: Programme des nations unies pour le développement / United Nations Development Programme

PNRPE: Programme national de recherche sur les perturbateurs endocriniens / National research programme on endocrine disrupters

PNNS: Programme national nutrition et santé / National nutrition and health programme

PST: Plan santé travail / Health at work plan

REACH: Règlement européen instaurant un système européen unique d'enregistrement (Registration), d'évaluation (Evaluation) et d'autorisation (Authorisation) des substances chimiques (Chemicals) / European regulation on the registration, evaluation and authorisation of chemical substances

RNV3P: Réseau national de vigilance et de prévention des pathologies professionnelles / National network for monitoring and preventing occupational diseases

SLA: Sclérose latérale amyotrophique / Amyotrophic lateral sclerosis

SNPE: Stratégie nationale sur les perturbateurs endocriniens / National strategy for endocrine disrupters

VLEP: Valeurs limite d'exposition en milieu professionnel / Workplace exposure limit values