

ENVIRONMENT AND HEALTH STRATEGIC POLICY OUTLINE

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This paper outlines recommendations for future activities in environment and health policy intended as a follow up of the European Environment and Health Action plan (2004-2010).

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Executive summary

Every European Citizen has a right to an environment that does not endanger his or her health and to a high level of human health protection. This is implicit in the Charter of Fundamental Rights of the European Union (2000/C364/01), and since the Treaty of Lisbon, has become legally binding.

The environment plays a crucial role in human health and social well-being and health is a major driver of environment policy. Covering the main environmental determinants of health requires concerted actions across a wide range of policies and responsibilities. Legislation and measures in the field of E&H fall under the responsibility of several policy sectors, while the costs and benefits of E&H policy are also relevant to different sectors.

Based on the 6th Environment Action Programme, the European Environment and Health Strategy was launched in 2003 and to cover the first cycle of this strategy, the European Environment & Health Action Plan 2004-2010 (EHAP) was launched in 2004. Main objectives were to improve the information chain, fill the knowledge gaps, to review policies and to improve communication.

Lessons learnt from the first EHAP were that activities launched were restricted by the lack of a dedicated budget to implement actions. Therefore activities concentrated mostly on improving the research base and gathering information on E&H issues. The EHAP served as an essential catalyst to promote research at the EU level and stimulated E&H activities in Member States. Now, in the following phase, research results should be followed up by political action.

Changes and new challenges require consideration within a broader spatial, socio-economic and cultural context. Main changes that have taken place since 2003 are (i) Enlargement of the EU - more Member States and so more differences in the state of environment and health; (ii) Demographic change – e.g. more older people; (iii) Growing numbers of people living in urban areas; (iv) Health outcomes: increase in some cancers, diabetes, asthma, allergies, and certain other diseases; (v) Economic downturn – lower budget for E&H Policy.

The current challenge in EU policy is driven by "EUROPE 2020 - A strategy for smart, sustainable and inclusive growth". The next phase of the E&H strategy should take into account the impact on health of EU environment policy and of the policy on climate change and energy. Ambitious objectives for the reduction of greenhouse gas emissions, increase of energy from renewable sources and increases in energy efficiency to promote sustainable growth by a more resource efficient, greener and more competitive economy may all have a health policy element that has yet to be fully realised. In this paper, resource efficiency and biodiversity has been considered in some detail.

Certain objectives of the policies above may be in a competition or in conflict with policies for clean air, water and soil as well as health. Examples of possible conflicting fields of resource efficiency policy with E&H are: (i) biomass production, processing and combustion (ii) Recycling of materials using methods or under conditions that are harmful to E&H; (iii) Energy-saving (e.g. sealed houses, indoor air quality); (iv) Renewable-fuel based heating - wood combustion in houses (air quality); (v) Biofuel – production and exhaust gas (unknown component emissions); (vi) land use for biomass in competition with food and nature.

The EU 2020 biodiversity strategy aims to halt the loss of biodiversity and the degradation of ecosystem services in Europe and to restore them as far as possible. Although health is not directly addressed, biodiversity and ecosystem services are crucial for human life and in general have a positive influence on health.

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Health strategies The White Paper “Together for health – a strategic approach for the EU 2008-2013 and the second Programme of community action in the field of health (2008–2013) address inter alia the health effects of wider environmental determinants, including indoor air quality (IAQ), exposure to toxic chemicals and socio-economic factors. The third programme, “Health for growth programme (2014-2020)” focuses on healthcare, prevention of diseases, and protections of citizens against cross-border health threats. Environmental issues are not explicitly included.

The new Framework Programme for Research and Innovation (2014–2020), Horizon 2020, will focus on three aspects where there is a clear EU added value to be had: Excellent Science, Industrial Leadership and Societal Challenges. Health is mainly addressed within the 'societal challenge' *Health, demographic change and well-being*. The “Specific Programme Implementing Horizon2020” describes specific activities in this field. However, environment and health can be funded under various parts of the Horizon 2020 programme.

Classical areas of environment policy are the protection of air, water, soil, biodiversity and the food chain from the impact of chemical and other pollutants. Policies, which prevent pollution, e.g. by reducing emissions to air, water and soil, reducing noise and by using safe chemicals in products, protect both the environment and human health. In this paper, policies on outdoor and indoor air, water and chemicals are considered in more detail. Policies for food, soil, waste, transport and other environment sectors like climate change – which also have an impact on health – are also important, but are not covered by this paper.

Air quality has an immense impact on health. Even though the emissions of the main air pollutants in Europe have declined significantly over recent decades, at present particulate matter and ground-level ozone are Europe's most problematic air pollutants in terms of harm to human health. More effort is necessary to improve air quality, mainly by emission reductions. However, it becomes increasingly difficult to identify and regulate emitters, because more small and diverse sources are contributing increasingly to the pollution. The use of biomass for fuel and energy production may contribute to increased levels of air pollution.

Noise has a significant impact on health. At least one million healthy life years are lost every year from traffic-related noise in the western part of Europe. To protect the public from environmental noise, collaboration between European Commission (DGs ENV, MOVE, JRC), WHO, EEA and the EU MS are increasingly strengthened with the aim of implementing the 2010 Parma Declaration and the EU noise related directives in a synergistic way.

People spend most of their time indoors. Therefore, good indoor air quality (IAQ) is important for human health. Important sources of indoor air pollution are a wide range of products such as building materials, furniture, carpets and cleaning products which emit a variety of biological, chemical and physical agents, influencing IAQ and contributing to human exposure indoors. IAQ is also influenced by activities carried out indoors such as cooking and smoking and by air exchange through ventilation. In addition, the use of solid heating material indoors can worsen indoor air quality. Also, pollution from ambient air from outside (especially particulate matter) can contribute to indoor air contamination.

The main aim of EU water policy is to ensure that throughout the EU a sufficient quantity of water of good quality is available for people and for the environment. The drinking water directive sets standards for tap water. The implementation of these standards is enforced and monitored to ensure access to safe drinking water for all citizens. Also, safe piping is a prerequisite to providing good quality for the end-user. Safe and tasty drinking water (and adequate sanitation) reduce water-related diseases and reduces consumption of plastic bottled mineral water. Chemical pollution of water, particularly from pharmaceuticals, is also a threat to the aquatic environment and to human health. Treatment of waste water to avoid contamination and to remove pharmaceuticals so as to produce safe drinking water is a serious challenge.

Chemicals are an integral part of our daily lives. The main EU chemicals legislation (REACH) has been designed to promote the substitution of dangerous chemicals and to foster the

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innovation of new and safer substances. More effort is needed to increase our knowledge in particular on the combined effects of chemical mixtures on health, on endocrine disrupters and on persistent and bio-accumulating chemicals as well as the effects of low dose, long term exposure and on emerging issues like health effects of nanomaterials. Also, relevant research findings on the health risks of chemicals conducted in the first phase of the EHAP should now be further carried forward into policy action.

The great majority of the EU population lives in urban area and the urban population is continuously increasing. Improvement of urban design ("Greening the Cities") is essential to address a wide variety of environmental issues including heat, noise, air and water quality, as well as transport but also a natural environment. Indicators should be developed to show positive effects of the stimulating environment which 'Green Cities' can provide".

Similar EU-wide problems on E&H call for similar solutions; therefore, networking and collaboration at EU level, between countries and regions and at local levels, to share information and to learn from experience and from best practice would help to promote effective measures to meet the requirements of legislation and to improve E&H policy.

The use of decision support tools such as those related to integrated environment and health impact assessments is helpful for evaluating the health impact of policies and measures. These tools have to be further developed and the associated data and knowledge base should also be improved.

There are some methods and tools available, such as monitoring programmes for environmental contaminants, human bio-monitoring (HBM) as well as surveys which combine and analyse exposure and additional factors, e.g., via questionnaires. In addition, modelling allows the calculation of the environmental burden of disease (mortality and morbidity) and the estimation of costs and benefits of actions or no-actions. For using these methods in policy, more research and information is needed to get reliable results. There is also a need for a tool to enable a first quick check about a potential impact on health of any particular cross-sectoral policy.

More and specific data are necessary for population based exposure, dose response relationships, attributable risks, safe levels (environment and internal dose), countable health outcomes with data on incidence and prevalence, modelling of E&H risks and estimation of costs. Information systems like ENHIS, INSPIRE and SEIS should provide data for assessments, in such a way that data can be accessed, re-used and shared for many purposes in the E&H area.

Research findings from the first EHAP cycle should now more actively be translated and carried forward into policy actions. The science-policy interface should be improved and specific efforts should be made to facilitate the transfer of research results into policy-relevant findings. In times of economic crisis, it is important to improve and strengthen collaboration between researchers and policy makers to get targeted research results suitable for policy decisions and measures.

Socially deprived people often live in more polluted areas and are more vulnerable to further environmental stressors. WHO EUROPE is working on social inequities and had it addressed at the Parma Conference 2010 and ongoing work should be supported by the EU.

In conclusion, E&H issues are complex and cross cutting, therefore requiring strong collaboration among various experts and sectors (environment, health, research, energy, climate, transport, etc) so as to include potential health impacts. Classical fields of environmental policy like for air, water, soil and chemicals may protect both environment and health, but policies in other fields like resource and energy efficiency may conflict or compete with progress on health.

Cooperation and networking at all levels should be reinforced, to promote sharing of information and research results and to learn from best practice at EU, national, regional and communal levels.

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Prevention is more economic than treatment; therefore health aspects should be included in other policies from an early stage of planning. In times of economic crisis, collaboration among the different fields of environment is very important, because costs and benefits occur in different sectors and under various responsibilities .

A specifically ear-marked budget for health in the environment policy context would enable actions to be undertaken in a broader spatial, socio-economic and cultural context and performed in a flexible way cross-cutting various sectoral E&H policies.

Summary of actions:

Effective work on environment and health should continue and coordination should be reinforced, synergies and strengthen collaboration increased at all levels and in all related areas, in particular EUROPE 2020 strategy and follow up papers, so that E&H aspects are included from the early stage of policy planning.

Platforms and tools should be provided at EU level to support networking of environment and health experts and collaboration with experts from other sectors to assess the impact on health of all policies.

More efforts from Member States are needed to implement E&H policy and meet the targets.

Better integration of health aspects in strategic spatial planning like transport infrastructure planning within the Strategic Environmental Assessment

Development and implementation of indicators to measure positive health effects of biodiversity and the natural environment (particularly to promote healthy urban design ("Green cities"))

Improve the knowledge base and tools about the links between environmental exposure and health outcomes, to arrive at dose-response-functions which allow reliably quantification of the health effects and identification of safe levels of contaminants in the environment and in humans; improve methods for modelling, performing EBD and for cost/benefit analysis to estimate the impact of environmental stressors reliably and comparably; develop tools to evaluate the success of policy actions on health

Research on emissions from renewable materials and biomass (life cycle assessment)

Harmonisation of data collection and better accessibility, in particular to improve the monitoring and availability of population based health data

Targeted research in environment and health to meet the needs of policy-makers; Intensify the translation and transfer of available research findings into E&H policy; Improve co-ordination and collaboration amongst researchers and policy makers/funders to encourage targeted research, which allows knowledge-based decisions in the E&H policy-making process.

Development of new innovative technologies to improve health e.g. intelligent ventilation systems for "sealed" houses, efficient heating systems with low particle emissions, and low emission furniture and building materials, water treatment plants (waste water, drinking water) to remove pharmaceuticals and other harmful chemicals

Development of tools to inform and educate people about environmental risks, environmentally friendly and healthy behaviour and life styles, so that they are aware of the dangers and can make informed choices

Special attention by all environment activities for socially deprived people (more justice, fairness; support for the activity of WHO Europe in this field;

1. Introduction

Every European Citizen has a right to an environment that does not endanger his or her health and to a high level of human health protection. This is implicit in the Charter of Fundamental Rights of the European Union (2000/C364/01), and since the Treaty of Lisbon, has become legally binding.

The overall aim of professionals working in the area of environment and health (E&H) is to minimise the environmental burden of disease (mortality and morbidity) by reducing negative environmental impacts; but also by maintaining and improving health and well-being through a well-managed and stimulating natural environment and access to green spaces.

The environment plays a crucial role in people's health and social well-being. The World Health Organisation (WHO) Regional office for Europe defines "environment and health" as including "both the direct pathological effects of chemicals, radiation and some biological agents, and the effects (often indirect) on health and well-being of the broad physical, psychological, social and aesthetic environment, which includes housing, urban development, land use and transport."¹

Health is a major driver for environment policy. Progress has been made towards a cleaner environment in recent decades but efforts need to be continued and strengthened to meet policy targets and to reduce the negative impact of environment on health to a level which is neither harmful to humans nor to the environment.

Covering the main environmental determinants of health requires concerted actions across a wide range of policies and areas of responsibility. Beyond the classical environment policies for clean air, water and safe chemicals, the impact of other policy sectors on environment and health is very diverse and complex, e.g., in the areas of resources, energy, transport, urban design and planning, and land use. Although the ultimate aim is to protect human health, the legislation and measures in the field of environment and health (E&H) are often not under the responsibility of the health sector.

This strategic paper will raise awareness about how different sectors of environment policy account for health impact and will show the need for – and advantages of – increasing synergies by further deepening the collaboration in environment and health policy development.

Life expectancy in the EU has been progressing over the past decades to 76.4 years for men and 82.4 years for women in 2008. By contrast, the average number of healthy life years has been progressing at a much slower pace: 60.9 years for men and 62 years for women. WHO Europe estimates that the burden of disease caused by environmental stressors in the European region (53 countries) lies between 15 and 20 % of total deaths and 18 to 20 % of disability-adjusted life years (DALY = Years with lost quality of life by morbidity and loss of years through premature death) with a relatively high burden in the eastern regions². The health budget is about 12 to 15 % of public expenditure in Member States³.

There are many estimates of the costs and gains of policy actions in E&H. The ban of leaded gasoline provided immediate and significant human health benefits. Considering the environment and health costs caused by air pollutants alone, €20 to 45 billion will be saved each

¹ Environment and health. The European Charter and commentary. Copenhagen, WHO Regional Office for Europe, 1990 (WHO Regional Publications, European Series, No 35)

² SOER 2010

³ EUROPEAN ECONOMY 2010: Projecting future health care expenditure at European level: drivers, methodology and main results Economic Papers 417 July 2010;
http://ec.europa.eu/economy_finance/publications/economic_paper/2010/pdf/ecp417_en.pdf

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year once the future targets of EU legislation are met⁴. WHO estimated in 2011 that at least one million healthy life years are lost every year from traffic-related noise in the western part of Europe⁵.

But costs and benefits occur in different sectors. Therefore cross-sectoral consideration and collaboration among environment and health experts as well as the embedding of health issues in environmental policies (which is also in line with the Lisbon treaty⁶ article 168 – health protection in all Union policies and activities) is necessary. Including health aspects at an early stage of planning legislation and activities in various sectors will reduce negative health impacts as well as saving costs.

Overall objective 2020: All EU Member States have implemented environment policy to the extent necessary to bring a significant decrease in the environmental burden of disease

Overall vision 2050: All citizen of Europe live in a healthy environment with a high quality of life, notably exemplified by green cities.

2. Lessons learnt from the first cycle of the European E&H Strategy

Any further phase of the European Environment and Health Strategy⁷ will need to take into account the experience of the first cycle, particularly lessons learnt from the European Environment & Health Action Plan 2004-2010⁸.

Based on the 6th Environment Action Programme⁹ (EAP) the European Environment and Health Strategy was launched in 2003. It is also known as the "SCALE Initiative": SCALE promoted a comprehensive, long term approach based on Science, focusing on Children, that raises Awareness on the interconnections between environment and health, that uses the Legal instruments, including constant and continuous Evaluation to verify the efficacy and cost effectiveness of the actions.

For the first cycle of the European E&H Strategy, the European Environment & Health Action Plan 2004-2010 (EHAP) was launched. Main objectives were to improve the information chain, fill the knowledge gaps as well as to review policies and improve communication. To support a number of EU policies, e.g., in the field of chemicals or nanomaterials, a large amount of research on environment and health was funded by the EU research framework programmes, greatly expanding the scientific knowledge base and building a European research area in E&H¹⁰. Ongoing activities included, among others, projects on harmonising human bio monitoring on a large scale in Europe, activities for information collection (ENHIS - European Environment and Health Information System: SEIS - Shared Environmental Information System, INSPIRE - Infrastructure for Spatial Information in the European Union), and research together with a strategic framework to address indoor air quality.

The outcome of the EHAP was analysed and recommendations for the next phase were provided by the progress report of the COMMISSION¹¹. This report presents the progress on

⁴ COWI-Report 2011

http://ec.europa.eu/environment/enveco/economics_policy/pdf/report_sept2011.pdf

⁵ http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf

⁶ <http://bookshop.europa.eu/en/consolidated-versions-of-the-treaty-on-european-union-and-the-treaty-on-the-functioning-of-the-european-union-pbQC3209190/>

⁷ COM(2003) 338 final

⁸ COM(2004) 416 final

⁹ COM (2001) 31 final

¹⁰ http://ec.europa.eu/research/environment/index_en.cfm?pg=health

¹¹ SEC (2010)387 final

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the activities undertaken after the midterm review in 2007¹², assessing the results of EC funded research projects (details of these research results can be found in the Annexes of the progress report) and preparing the follow-up of the Action Plan post 2010. Concerning the follow-up, the views of the EU Member States and the Consultative Forum on Environment and Health – as well as from the Council and European Parliament – were taken into account. The progress report proposed to continue coordination and to strengthen collaboration between the health, environment and research sectors at both Member State and EU level, focusing on actions in inter-sectoral areas like human bio-monitoring, indoor air quality, climate change and on environment and health information systems.

DG Research and Innovation funded a study carried out by an external impact assessment consultancy on the longer-term impact of EU funding of research in the field of Environment and Health in 2010¹³. The study concluded, *inter alia*, that there was objective evidence that projects funded by the framework programmes have contributed to a variety of EU policies. National level stakeholders are convinced that the funded research projects/activities in the area of environment and health have complemented and/or contributed to national policies/actions. The study concluded that a second EHAP would be useful for all stakeholders.

The SOER 2010 report¹⁴ (European environment state and outlook 2010) produced by the European Environment Agency stated that despite significant improvements, major differences in the quality of the environment and human health remained among and within European countries. Looking at the progress and trends for E&H over the past 10 years, urban air quality, especially particulate matter and ozone, remained the most urgent E&H problem in the EU. For future actions, the complex relationships between environmental factors and human health should be seen in a broader spatial, socio-economic and cultural context.

The Belgian Federal Minister for Environment commissioned a study on "The EU Environment and Health Action Plan (EHAP) – Assessment and Outlook for future action"¹⁵. This document contains a detailed list of policy opportunities for environment and health for the period from 2011 to 2015. The EHAP focused on research and information. Actual policy actions on preventing and reducing environmental risks were mostly postponed to the next phase. The report stated that the results of research should be better and more consistently used in risk assessments and policy development.

Lessons learnt from the first EHAP show that the activities launched were constrained by the lack of a dedicated budget to implement actions. Therefore activities were mostly concentrated on improving the research base and gathering information on E&H issues. The EHAP served as an essential catalyst to promote research at the EU level and stimulated E&H activities in Member States.

Now, looking towards a subsequent phase, these results should be carried forward into political and policy action, including prevention for example in the chemicals field, addressing the concerns raised by persistent, endocrine-disrupting, bio-accumulating, harmful chemicals and by novel and emerging issues. The use of decision support tools such as those related to integrated environment and health impact assessments will need further development. A specifically ear-marked budget would enable actions to be undertaken in a broader spatial, socio-economic and cultural context and then delivered in a flexible way cutting across the various sectoral E&H policies.

¹² COM(2007) 314 final

¹³ http://ec.europa.eu/research/environment/pdf/cowi_study.pdf

¹⁴ EEA SOER 2010: www.eea.europa.eu/soer

¹⁵ <http://www.health.belgium.be/internet2Prd/groups/public/@public/@nehap/documents/ie2form/19063534.pdf>

3. Changes and new challenges in environment and health

The European Environment and Health Strategy was launched in 2003. Since then changes and new challenges have happened or are expected in the coming years, and this should be taken into account for future E&H policy.

Main changes and challenges are:

New strategies in European policy: EUROPE 2020 - A strategy for smart, sustainable and inclusive growth¹⁶ - One of the three mutually reinforcing priorities is sustainable growth to promote a more resource efficient, greener and more competitive economy. The EU will maintain its lead in the market for green technologies as a means of ensuring resource efficiency throughout the economy. This means a shift in EU environmental priorities to climate change (low carbon), resource and energy areas.

Enlargement of the EU since 2003: More Member States also means more differences and diversity in the status of environment and health. A wider variety of problems would suggest a need for careful consideration and maybe nationally or regionally specific solutions to help meet EU policy standards.

Economic crisis: More effort is needed to show the necessity for and added value of investing money in health and a healthy environment, particularly because the costs and the benefits occur in different sectors. The financial crisis could amplify socio-economic inequalities. But there is also significant potential for investment in development and innovation of new technologies for environment and health which will contribute towards economic growth, e.g. intelligent ventilation systems for low-energy housing (indoor air quality), electric cars (noise, air pollution), water purification techniques.

Demographic change: The focus of the European E&H strategy has been on children as a vulnerable group; but due to a higher life expectancy and lower fertility, the number of older people is growing. The proportion of people over 65 is expected to increase in Europe from about 17 % in 2010 to more than 30 % in 2060¹⁷. Demographic changes, including population ageing, are accompanied by an increasing number of chronic diseases, which are largely environment-related and thus could be prevented (prevention being more cost efficient than treatment). A higher consumption of pharmaceuticals will increase water pollution and may generate consequent adverse health effects.

Increase of urban population: About 75 % of the European population lives in urban areas and this is expected to increase to 80 % by 2020¹⁸ (EEA 2006). Therefore urban planning and design will be major issues over the coming years, also in connection with climate change adaptation, transport and concepts for Green Cities, with special attention to be paid to children and the elderly.

Health outcomes: Rates of obesity, diabetes, diseases of the cardiovascular and nervous systems and cancer as well as reproductive and mental health problems are rising. Chronic diseases are the main cause of death and poor quality of life in Europe. Over 4 million people in the European Union die every year because of chronic diseases, which represents 87% of premature mortality in the EU¹⁹. Chronic respiratory diseases such as asthma, as well as allergies and some types of cancer are of particular concern for children²⁰. It is estimated that all of these diseases have a significant environmental and life-style causal component. Better

¹⁶ COM(2010)2020

¹⁷ EU demography report 2010:

<http://ec.europa.eu/social/main.jsp?langId=en&catId=502&newsId=1007&furtherNews=yes>

¹⁸ Urban sprawl in Europe The ignored challenge EEA Report No 10/2006

http://www.eea.europa.eu/publications/eea_report_2006_10/eea_report_10_2006.pdf

¹⁹ COM(2011) 709 final

²⁰ SOER2010

scientific evidence is needed to understand and to quantify the contribution of environment to these diseases, so that the environmental burden of disease can then be tackled.

The next phase of the E&H strategy should take into account the impact on health of all EU policy priorities. Changes and new challenges need to be considered in the broad spatial, socio-economic and cultural context²¹.

4. Actions for E&H policy

4.1 Actions within the EU Strategy 2020 and follow-up papers

The EU policy challenge for the near future is driven by "EUROPE 2020 - A strategy for smart, sustainable and inclusive growth"²². One of the five headline targets is climate change and energy with ambitious objectives on the reduction of greenhouse gas emissions, increased supply of energy from renewable sources and increases in energy efficiency. These will promote sustainable growth and progress towards a more resource efficient, greener and more competitive economy. Some of the actions to reach these objectives may generate negative effects on environment and health. Moreover, they may be in competition or in conflict with policies for clean air, water and soil as well as with health, e.g., the possible increase of particulate matter in air due to increased biomass burning by aiming to reduce 20 per cent domestic greenhouse gas emissions²³.

One of the seven Flagship initiatives of the Strategy 2020 is the "Resource efficient Europe"²⁴ aiming, *inter alia*, to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise the EU transport sector and promote energy efficiency. The objectives can only be achieved with a policy mix that optimises synergies and addresses trade-offs between different areas and policies.

The impact on environment and health from policies on low carbon economy, energy efficiency and transport, as well as on common agricultural and fisheries policies, is not considered in this paper but would need to be taken into account from the beginning of policy planning and actions in these areas.

4.1.1 Roadmap to a Resource efficient Europe

The Roadmap to a Resource Efficient Europe²⁵ contains milestones to be reached by 2020. Health is more or less addressed in the classical environment and health areas of chemicals, water and air, but also to some extent in the field of waste, biodiversity and sustainable consumption and production.

Resource efficiency policy matters come under the responsibility of different sectors and it would require strong cooperation with these sectors to ensure that E&H is taken fully into account. Consideration of E&H aspects from the outset can reduce negative health impacts by including accompanying actions as policy is implemented, which can even improve health and thus reduce the associated burden of health related costs.

²¹ SOER 2010

²² COM(2010)2020

²³ SWD (2012) 5 final

²⁴ COM(2011) 21

²⁵ COM(2011) 571 final

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However, there are also areas where associated health aspects are not mentioned in the roadmap. These areas are research and innovation, environmentally harmful subsidies, land use, improvement in building construction and ensuring efficient mobility.

Actions:

- *Integration of E&H in research and innovation for green and low-carbon economy right from the start;*
- *Consideration and elimination of environmentally harmful subsidies which affect health, such as some transport subsidies;*
- *Integration of health aspects by analysing land use and spatial planning within a Strategic Environmental and Health Assessment;*
- *Consideration of health aspects of future transport policies including measures for transport reduction, which seem not yet to be an option of current policy but is one of the most effective ways for resource and energy saving and has positive effects on environment and health.*
- *Research on knowledge gaps about the health and environment impact of the use of renewable fuels and biomass with a full life cycle assessment putting a special emphasis on health aspects;*

4.1.2 Biodiversity

The EU biodiversity strategy to 2020²⁶ sets out six main targets and 20 actions to help Europe to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and to restore them as far as feasible. Although health is not directly addressed, biodiversity and ecosystem services are crucial for human life. Biodiversity secures genetic diversity which is essential for food and medicine.

Activities for biodiversity and ecosystem services in general have a positive influence on health.

Actions:

- *Better integration of health aspects in strategic spatial planning like transport infrastructure planning within the Strategic Environmental Assessment to consider possible effects on environment and health;*
- *Indicators should be developed to measure the positive health effects of biodiversity and natural environment in cities;*

4.1.3 Health Strategy and programmes

The White paper "Together for Health A strategic Approach for the EU 2008-2013"²⁷ pointed out that there are several growing challenges to health which require a new strategic approach. Demographic changes including population ageing are accompanied by changing disease patterns.

The Second programme of Community action in the field of health (2008-2013)²⁸ indicated in its preamble, that 'environmental pollution is a serious risk to health, and a major source of concern for European citizens'. Special action should focus on children and other groups,

²⁶ COM(2011) 244 final

²⁷ COM (2007) 630 final

²⁸ DECISION No 1350/2007/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

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which are particularly vulnerable to hazardous environmental conditions. Furthermore, among the specific actions included in the programme was one to 'address the health effects of wider environmental determinants, including indoor air quality (IAQ), exposure to toxic chemicals and socio-economic determinants'.

This programme has contributed to enhancing the evidence base in the aforementioned specific areas, but including also ambient air, electromagnetic fields and the environment and health workforce. It has also helped by informing policy developments and priorities.

The EC proposal for a Health for Growth Programme²⁹, the third multi-annual programme of EU action in the field of health for the period 2014-2020 see health not just a value in itself but also as a driver for growth. Therefore the links between economic growth and a healthy population is strengthened by this programme. It aims to contribute to disease prevention and promotion of good health, bearing in mind underlying factors of a social and environmental nature.

The health for growth programme (2014-2020) focuses on four objectives: innovative and sustainable health systems, access to better and safer healthcare, prevention of diseases, and protections of citizens against cross-border health threats Environmental factors are not explicitly included but could be addressed e.g. through the prevention of chronic diseases or the protection of citizens from cross-border health threats.

Actions:

- *Improve the knowledge base to improve understanding and quantify the contribution of environmental factors to chronic diseases which have an increased incidence such as diabetes, chronic respiratory diseases such as asthma, allergies, cardiovascular diseases, cancer, reproductive and developmental dysfunctions.*
- *Improve the knowledge base to understand and quantify the contribution of environmental factors to communicable diseases*
- *Transmission of research findings into legislation and/or actions which reduce the environmental burden of these diseases*
- *Reflect how natural environment can contribute to health and well-being and identify factors and develop indicators which can show and quantify the positive effects of the environment on health and how to appropriately implement these findings in urban planning.*

4.1.4 Research policy and Horizon2020

It was one of the main objectives of the EHAP to improve the knowledge base on E&H. The progress report of the COMMISSION³⁰ on the implementation of the EHAP includes in its Annexes a detailed description of research results of Environment and Health projects from the 5th to the current 7th framework programme. Detailed analyses are shown in the "Study on the longer-term impact of EUROPEAN funding of research in the field of Environment and Health"³¹ including mapping, E-survey and interviews on the relevance for policy as well as recommendation for the follow up of the EHAP.

²⁹ EC Proposal for a Regulation of the European Parliament and of the council on establishing a Health for Growth Programme COM (2011) 709 final

³⁰ SEC (2010)387 final

³¹ European Commission 2011 http://ec.europa.eu/research/environment/pdf/cowi_study.pdf

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Many EU-funded projects have brought together experts from different fields, collected data, created databases and developed policy support tools, which may be helpful for decision makers. With the end of EU funding, the findings are at risk of not being fully exploited and no longer maintained and updated databases become useless. There should be the possibility for further continuation and use of the experience gained and results obtained in the previous EHAP cycle, e.g. as platforms or fora for specific topics.

The new Framework Programme for Research and Innovation (2014- 2020), Horizon 2020,³² will focus resources on three distinct, yet mutually reinforcing, priorities, where there is a clear EU added value. These priorities correspond to those of Europe 2020 and the Innovation Union. A challenge-based approach will bring together resources and knowledge across different fields, technologies and disciplines, including social and human sciences. Beside "excellent science" and "industrial leadership" health is mainly under the "societal challenges" section in combination with demographic change and well-being.

The Specific Programme Implementing Horizon2020³³ describes specific activities in this field. Under the 'Health, demographic change & wellbeing' societal challenge, a specific activity 'Understanding the determinants of health, improving health promotion and disease prevention' is proposed. This calls for funding research on, inter alia, the environment as a determinant of health, including innovative approaches to environmental exposure assessment and integrating socio-economic and behavioural factors.

Environment and health related issues are also covered by other areas, e.g., 'leadership in enabling and industrial technologies' includes environmental and health risks related to nanomaterials; food security, sustainable agriculture, marine and maritime research and bio economy, societal challenge research on environmental and food contaminants; and 'Climate action, resource efficiency and raw materials' societal challenge activities on health impacts of climate change.

Environment and health research is included in Horizon 2020 as a cross-cutting issue and can be funded under various parts of the Horizon 2020 programme, the main one being 'Health, demographic change & well-being' in the societal challenge context.

Actions:

- *Research in environment and health should be more targeted towards knowledge which is needed for policy making*
- *Translation of research findings for policy and communication of results should be an integral part of the research undertaken*
- *There should be a way to maintain and update relevant and helpful information collected in databases or tools during research projects also beyond the duration of a funding scheme.*
- *Data and information collected should be better available to policy makers*
- *A mechanism to fund E&H research across sectors and policies in a coordinated manner should be created*
- *Health aspects should be included in research related to all sectors of environmental policies to avoid negative impact on health.*

Research proposals are listed in the specific chapters and summarized in Annex 1.

³² COM808 (2011)

³³ COM(2011) 811 final

4.2 Activities on environment and health in specific areas

Classical areas of environment policy are the protection of air, water and food chain from the impact of chemicals and other dangerous pollutants. Also policy for food, soil, waste, transport and other environment areas have an impact on health but cannot be covered by this paper.

Climate change and health is as well a major issue. Beside extreme weather events the influence of climate change on communicable diseases (like conditions for vector borne diseases) and non-communicable diseases (like for allergies exposure time to polls) have an impact on health, but is not further considered in this paper. These areas should be included by further E&H activities.

Policy which prevents pollution, e.g. by reducing emissions to air, water and soil, by using safe chemicals in products and by reducing noise, protect both the environment and human health.

4.2.1 Air quality and noise

Air quality and noise have an immense impact on health. Current concentrations of fine particles cause about 500 000 premature deaths each year in the EU and the immediate neighbourhood (SOER 2010). Even though the emissions of the main air pollutants in Europe have declined significantly in the last decades, at present particulate matter and ground-level ozone are Europe's most problematic air pollutants in terms of harming to human health³⁴. Fine PM exposure is a significant risk factor for the cardiovascular diseases, but also for chronic respiratory diseases and lung cancer. 20 % of the EU urban population lives in areas where the EU air quality 24-hour limit value for PM₁₀ was exceeded in 2009 (SOER 2010). Meeting the 2020 targets of the Thematic Strategy for Air Pollution is valued to about 20 – 40 billion EURO per year in reduced health damage³⁵.

More effort is necessary to improve air quality, mainly by emission reductions. However it becomes increasingly difficult to identify and regulate emitters, because more small and diverse sources are contributing to the pollution. The use of biomass for fuel and energy production may contribute to increased levels of air pollution if not counter measures are introduced at a large scale. A possible increase of particulate matter is predicted through reducing greenhouse gas emissions by 20 per cent³⁶.

Box 1 - Example:

The effects of greenhouse gas reductions (GHG-reductions) on air quality³⁸

A scenario on GHG-reductions by 20 % shows that PM_{2.5} increases as a consequence of implementing measures to reduce total GHG emission. The increase will be less with a GHG reduction of 25 %. On the other hand, SO₂ and NO_x will decrease under both reduction scenarios, which will also lead to a lower ground-level ozone concentration. The reason for the increase of PM_{2.5} is the use of renewable energy such as biomass in domestic heating. A higher reduction will require better technology in larger combustion plants and an overall reduction in energy consumption.

Noise has a great impact on health. At least one million healthy life years are lost every year from traffic-related noise in the western part of Europe³⁷.

³⁴ EEA report on Air quality 2011

³⁵ COWI-Report http://ec.europa.eu/environment/enveco/economics_policy/pdf/report_sept2011.pdf

³⁶ SWD (2012) 5 final

³⁷ http://www.euro.who.int/_data/assets/pdf_file/0008/136466/e94888.pdf

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The recently concluded Environmental Burden of Disease in Europe (EBoDE) project³⁸ in six European countries ranked noise as second among nine environmental stressors evaluated in terms of their public health impact in Europe immediately after particulate air pollution and before other stressors highly relevant for policy development and evaluation such as radon, lead, ozone, passive smoking, dioxins, benzene and formaldehyde. Moreover, trends of noise exposure are increasing in Europe.

To protect the public from environmental noise, collaborations between European Commission (DGs ENV, MOVE, JRC), WHO, EEA and the EU MS are increasingly strengthened with the aim to implement in a synergistic way the 2010 Parma Declaration and the EU noise related directives.

The Directive 2002/49/EC³⁹ is an umbrella Directive relating to the assessment and management of environmental noise aims to define a common approach intended to avoid, prevent or reduce the harmful effects, including annoyance, due to exposure to environmental noise. According to this Directive, Member States have to establish strategic noise maps and prepare action plans. The Directive does not set any limit values nor does it set other criteria triggering enforcement of abatement measures, as this falls under the exclusive competence of Member States.

In accordance with Art. 6.2 of the Directive 2002/49/EC (END), the European Commission decided to develop Common NOise aSSessment methOdS (CNOSSOS-EU)⁴⁰ for road traffic, railway traffic, aircraft and industrial noise to be used after adoption by the Member States for the purpose of strategic noise mapping as required by Article 7 of the END. CNOSSOS-EU aims at improving the consistency and comparability of noise assessment results across the EU Member States, which are performed on the basis of the data becoming available through the consecutive rounds of noise mapping in Europe as required by the END.

Actions:

EU legislation:

- *The review of the Thematic Strategy on Air Pollution, Air Quality legislation and the National Emission Ceilings Directive will be concluded⁴¹ by 2013. It will extensively review the environment and health objectives for 2020 and beyond and set out actions for the short and long term.*

Implementation and measures:

- *Additional efforts are needed at EU and national levels to meet the legally binding air quality standards. Measures have to be implemented, which will reduce pollution from the sources already regulated, such as industrial plants and vehicles as well as for sources being less regulated at the present, including small scale installations.*
- *Action is particularly needed in areas where people are most open to exposure, such as in urban areas or where vulnerable groups are living in particularly polluted areas.*
- *Traffic in urban areas is a major source of air pollution and noise. Action should be taken to reduce emissions and noise from motor traffic, inter alia by improving public transport and individual mobility by walking or cycling. This are also expected to lead*

³⁸ European Perspectives on Environmental Burden of Disease Estimates for Nine Stressors in Six European Countries, <http://www.thl.fi/thl-client/pdfs/b75f6999-e7c4-4550-a939-3bccb19e41c1>

³⁹ Directive 2002/49/EC of the Parliament and of the Council relating to the assessment and management of environmental noise. Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise, OJ L 189, 2002.

⁴⁰ http://ihcp.jrc.ec.europa.eu/our_activities/public-health/env_noise/ec-progress-report-environmental-noise

⁴¹ SEC(2011) 342 final

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to more physical activity with potentially increased health benefits such as lowering obesity rates, cardiovascular effects, etc.

- *There is also sometimes a lack of knowledge about the effectiveness of measures to improve air quality and reduce noise in cities. Collaboration, sharing of information, experiences and best practices is helpful in shaping a concise framework of actions at EU, national and local levels, to efficiently solve these problems.*

Research and innovation:

- *Further research and innovation is needed to identify pollutant emitters that may be need further regulation e.g. small sources like small scale combustion plants including domestic heating installations and sources related to road, rail, water and air transport as well as agricultural practices*
- *Knowledge and new technologies are required to reduce the emissions at the source or use filter techniques, e.g. for heating systems with solid fuel*
- *Life cycle assessment should be carried out to investigate the impact of emissions of renewable materials and biomass used for energy production and fuel.*

4.2.2 Indoor air quality

Most people spend as much as 90% of their time indoors. Therefore, good indoor air quality (IAQ) is important for human health. The total calculated Burden of Disease (BoD) attributable to IAQ is estimated to be about 3 % of the total BoD from all causes, corresponding to two million years of healthy life lost annually in the EU⁴².

Ambient outdoor air is an important source of indoor air contaminants, such as particulate matter (PM) and to a lesser extent ground level ozone. However, there is increasing evidence that particles generated indoors may be more bioactive than ambient particles, often related to the presence of endotoxins and other proinflammatory components in particles of indoor origin. Given the complex composition of PM, further research on indoor PM from indoor sources is needed and more data on emerging compounds such as SVOCs (semi volatile organic compounds) adsorbed to airborne particles is also required.

Other important sources of indoor air pollution include a wide range of products such as building materials, furniture, carpets and cleaning products which emit a variety of biological, chemical and physical agents, influencing IAQ and contributing to human exposure indoors. The most severe IAQ issue is still indoor tobacco smoking but that is not considered in this paper. IAQ is also influenced by activities carried out indoors like cooking and, of course, by air exchange through ventilation. In addition, the use of solid heating material indoors can worsen indoor air quality.

WHO has published guidelines for indoor air quality for selected pollutants⁴³ such as benzene, formaldehyde, naphthalene, nitrogen dioxide and radon. A better knowledge base of exposure levels to other indoor pollutants is also required (e.g., phthalates and other organic substances), and a thorough risk characterisation, which includes toxicological assessments on the basis of dose-response functions is needed to get a clearer picture of the health impact and also to enable a better interpretation of HBM results.

Efficient ways to improve indoor air quality include appropriate design of building construction, the use of consumer products with low emission in the dwellings; innovative heating facilities; and sufficient air exchange by ventilation. Energy-saving measures in the built

⁴² http://ec.europa.eu/health/healthy_environments/docs/env_iaiaq.pdf

⁴³ WHO guidelines for indoor air quality: selected pollutants 2010
http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

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environment can result in reduced air exchange, which may lead to an increased exposure to mixture of harmful chemicals indoors. Therefore, it is important to accompany energy saving measures by additional activities for adequate ventilation with a parallel use of low emission materials.

An integrated impact assessment of policies related to the built environment, which takes on board energy, health, environment and sustainability aspects from the beginning, would certainly result in win/win situations by cross-cutting accompanying measures which will ensure both energy saving and health protection.

Ongoing activities such as the identification and quantification of main indoor air pollutants and the estimation of human exposure to these pollutants and their risk characterization should be continued, as well as the establishment of a harmonised framework for monitoring, testing and evaluating the health impact of emission of consumer products used indoors⁴⁴. This includes an agreed procedure for establishing a list of compounds and their associated threshold values to assess emissions from building products. This framework is primarily needed for enabling the comparability of IAQ exposure related data and reliably estimating the associated health burden within and across the EU Member States.

The possibility of cross-cutting regulation in the form of horizontal policy framework to improve indoor air quality with regards to their impact on health should be also considered.

The call for action on health determinants was identified in the European Parliament report⁴⁵ dated 15/12/2011, which stressed the importance of environment and health issues, in particular of air quality, including indoor air, climate change, and also the combined effect of chemicals.

This would also align with the WHO process on environment and health. The Parma Ministerial Conference held in March 2010 adopted a Declaration⁴⁶ recalling its commitment to implement the Children's Environment and Health Action Plan for Europe (CEHAPE), which is based on four Regional Priority Goals (RPGs), including aiming to prevent diseases through improved outdoor and indoor air quality (RPG3), and prevent disease arising from chemical, biological and physical environments (RPG4).

Actions:

Legislation:

- *Considerations of indoor air quality are also included in the review of the Thematic Strategy on air pollution⁴⁷ by 2013.*
- *A horizontal framework across existing overlapping and/or complementary legislative instruments and standardisation work related to the built environment should be put in place.*

Implementation and measures

- *Prevent and reduce IAQ-related diseases by measures to*
 - *reduce outdoor air pollution,*

⁴⁴ http://ihcp.jrc.ec.europa.eu/our_activities/public-health/indoor_air_quality/towards-the-harmonised-regulation-and-labelling-of-product-emissions

⁴⁵ http://www.europarl.europa.eu/meetdocs/2009_2014/documents/envi/pr/887/887278/887278en.pdf

⁴⁶ http://www.euro.who.int/_data/assets/pdf_file/0011/78608/E93618.pdf

⁴⁷ SEC(2011) 342 final

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- *reduce indoor air emission of pollutants at the sources with the use of low emission building materials and products and appropriately designed building constructions as well as sufficient air exchange and*
- *apply health based and energy efficient ventilation guidelines.*
- *Continue to identify and analyse indoor air problems versus health effects in all settings*
- *A Review on measures to improve IAQ is needed to learn from best practise and experiences and identify gaps*

Research and innovation

- *Further research is needed to continue identifying key sources of indoor pollution and characterising the sources, composition and toxicity of indoor particulate matter as well as their internal and external sources*
- *New methods should be developed to measure emissions indoors under real conditions*
- *Further research is needed to analyze dose-response relationships of indoor air pollutants and their associated health impacts, in particular combined effect of chemical mixtures in materials and products*
- *New innovative technologies should be developed to improve health by accompanying energy efficiency measures, such as intelligent ventilation systems for "sealed" houses, efficient heating systems with low particle emission, and low emitting furniture and building materials*

Communication

- *End users (building designers, architects, producers of consumer products, citizens) need to be consistently and adequately informed about the importance of healthy indoor air quality, about low emission materials and products and best practices to achieve a good IAQ in various indoor settings.*

4.2.3 Water quality

Human health can be affected by a lack of access to safe drinking water, inadequate sanitation, the consumption of contaminated freshwater, as well as exposure to contaminated bathing water (SOER2010). The main aim of EU water policy is to ensure that throughout the EU a sufficient quantity of water of good quality is available for people and for the environment. The drinking water directive⁴⁸ set standards at the tap. The implementation of these standards is enforced and monitored to ensure access to safe drinking water for all citizens. Also safe water-piping is a prerequisite of good quality for the end-user. Safe and tasty water through taps will reduce potentially adverse health impacts and has multiple positive effects (see box 2).

Most of the drinking water is prepared from surface water and the quality of surface water depends on, *inter alia*, waste water treatment plants. The full implementation of the Urban Wastewater Treatment Directive⁴⁹ will lead to cleaner surface water.

Chemical pollution of surface water presents a threat to the aquatic environment with effects of accumulation in the ecosystem, as well as a threat to human health⁵⁰. The Commission is

⁴⁸ COUNCIL DIRECTIVE 98/83/EC

⁴⁹ Council Directive 91/271/EEC concerning urban waste water treatment <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1991:135:0040:0052:EN:PDF>

⁵⁰ DIRECTIVE 2008/105/EC on environmental quality standards in the field of water policy

proposing to add 15 chemicals to the list of 33 pollutants that are monitored and controlled in EU surface waters. The 15 substances include industrial chemicals as well as substances used in biocides, pharmaceuticals and plant protection products. They have been selected on the basis of scientific evidence that they may pose a significant risk to health⁵¹.

There is increasing evidence that pharmaceuticals and other pollutants (e.g. from personal care products) are present in low but detectable quantities in drinking water⁵², although knowledge is insufficient. Pharmaceuticals are designed to have a specific physiological effect which may have potential negative impact on the environment and on humans. Sources are human and animal medical treatments and their distribution via waste water, manure and sewage sludge. The use of pharmaceuticals is increasing also due to a growing amount of people with chronic diseases. This presents a challenge for the treatment of waste water and for the preparation of safe drinking water. The severity of the problem should be investigated and monitored. Moreover, more research is needed to assess the potential hazards posed by a low dose mixture of pharmaceuticals and other pollutants in water.

The intensive land use for producing biomass for energy and the pressure to use other land areas for food production will lead to a higher use of fertilizer and pesticides, which can reach and contaminate groundwater and surface water. Measures should be taken to avoid contamination and to save costs for preparing drinking water of good quality.

Box 2 – Example:

Safe and tasty water at the tap

Safe water will reduce the burden of disease related to unsafe water (save health care costs).

Safe and tasty water at the tap in private homes will reduce the use of mineral water in plastic bottles and the pressure on the environment by reducing the use of plastic material, the transport of bottles and the amount of used plastic bottles⁵³ (save resources, save waste, reduce noise and pollution by less transport)

To get safe and tasty drinking water, having clean surface water and ground water is a prerequisite. If the water is clean, the suppliers need less preparation and chemical treatment to provide safe water at a reasonable price

To get surface water of good quality, water treatment plants should be able to remove harmful substances with new innovative technologies

As end users, people should be made aware of not unnecessarily polluting the waste water (save costs)

Actions:

Legislation:

- *The Blueprint to Safeguard Europe's Water will be the EU policy response to existing and emerging challenges to our water resources, which will be adopted by the end of 2012. It will aim to ensure good quality water in sufficient quantities for all legitimate uses.*

⁵¹ EUROPEAN COMMISSION - PRESS RELEASE IP/12/88 Brussels, 31 January 2012: Environment and Water: proposal to reduce water pollution risks

⁵² Benoit Roig (ed) 2010. Pharmaceuticals in the Environment: Current knowledge and need assessment to reduce presence and impact. IWA Publishing, London, UK

⁵³ COWI-Report 2011

http://ec.europa.eu/environment/enveco/economics_policy/pdf/report_sept2011.pdf

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Implementation and measures:

- *Continuing the implementation of the Urban Wastewater Treatment Directive will lead to cleaner receiving water and surface water*
- *Safe and tasty water should be available for all citizens in the Union, therefore continue the implementation of the Drinking Water Directive, with emphasis on water supply and sanitation in the small settlements*

Research and innovation

- *Research on reducing pharmaceuticals in surface and drinking water*
- *New techniques for water treatment plants (for drinking water and waste water) should be developed which are able to clean water from pharmaceuticals and other harmful chemicals*
- *Development of better detection technologies for microbial and chemical contaminations,*

Communication

- *Information should be provided to educate people about suitable behaviour in order to protect water and reduce water consumption*
- *Information about appropriate water piping to avoid contamination in private homes should be provided*

4.2.4 Chemicals

The 2002 Johannesburg Plan of Implementation of the World Summit on Sustainable Development (WSSD) renewed the comprehensive commitment, as advanced in Agenda 21, "to the sound management of chemicals throughout their life cycle and of hazardous wastes for sustainable development as well as for the protection of human health and the environment, inter alia, aiming to achieve, by 2020, that chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment..."⁵⁴ Sound chemicals management has a pivotal role to play in protecting human health and environment.

The main EU chemicals legislation – REACH⁵⁵ – has been designed to promote the substitution of dangerous chemicals and to foster the innovation of new and safer substances. REACH is a first step, but more effort is needed to increase our knowledge in particular on chemical mixtures, endocrine disrupters and on persistent and bio accumulating chemicals as well as the effects of low dose and long term exposure and for emerging issues such as nanomaterials.

There is also concern about the health impact of pesticides, biocides and heavy metals, which are not considered in this paper but should be included in further E&H activities.

Chemicals are an integral part of our daily lives. Research on the risks of chemicals and the link to health⁵⁶ has been conducted in the first phase of the EHAP and relevant findings should now be transferred into policy. Any indications of a potential risk should be considered

⁵⁴ UNEP: Mainstreaming the Sound Management of Chemicals into Development Planning: Background and Rationale"

http://www.chem.unep.ch/unep/psa/cm/mainstreaming/Documents/Mainstreaming%20the%20Sound%20Management%20of%20Chemicals%20into%20Development%20Planning_Background%20and%20Rationale.pdf

⁵⁵ REACH – Registration, Evaluation, Authorisation and restriction of chemicals, http://ec.europa.eu/environment/chemicals/reach/legislation_en.htm

⁵⁶ Study on the longer-term impact of EUROPEAN funding of research in the field of Environment and Health European Commission 2011 http://ec.europa.eu/research/environment/pdf/cowi_study.pdf

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seriously and, if a complete evaluation of the risk is not possible, the precautionary principle should be applied.

The contribution of harmful chemicals to the burden of disease in humans is not yet fully explored mainly due to the lack of population-based data on exposure and health effects as well as the lack of knowledge of dose-response-functions and quantifiable risks.

Regulatory approaches for the assessment of chemicals are usually based on individual substances, but in reality people are exposed to chemical mixtures from different sources and with combined health effects. Chemicals may influence each others; either by acting with similar or different modes of actions or by enforcing effects (synergism, antagonism). Hence, understanding and quantifying the effects of chemical mixtures, in particular at low doses and for long term exposure, requires a new and adequate methodological framework for risk assessment.

Endocrine disrupters interfere with hormonal systems and can produce adverse developmental, reproductive, neurological, and immune effects⁵⁷. Further research is needed to investigate the links of prenatal or early life exposure and effects later in life, such as fertility problems. The main focus should be to find and agree on approaches to identify chemicals with these hormonal disturbing activities and to harmonise methods for risk assessment⁵⁸.

Persistent organic pollutants are harmful to the environment and to humans. They are banned by the Stockholm Convention⁵⁹ and main sources are regulated, resulting in a significant declining in the air and humans in the past decades. But these chemicals are globally distributed, stored in soil and sediments and accumulate in the food chain, e.g., the levels of PCBs and dioxins in food such as in fish and animal fat are still too high⁶⁰. The mean intake of dioxin-like compounds exceeds the tolerable daily intake in many EU countries. Actions are necessary for further reduction of POPs by minimising the transfer into the food chain, identifying and banning further sources and by carefully monitoring the elimination of PCBs⁶¹. Furthermore, the emission of dioxin-like compounds from residential combustion, in particular with wood and from the use of biomass as an energy source, should be analysed.

Nanotechnology promises potential benefit for environment and health, for example by saving materials and energy however there are some concerns arising from the rapid development and wide and diverse application of nanomaterials. For example the use of nanosilver as an antimicrobial agent is widespread and the risk of developing silver-resistant microorganisms is of concern. Therefore the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) has been requested to provide a scientific opinion on nanosilver: "safety, health and environmental effects and role in antimicrobial resistance" by 2013. An inventory or product register giving an overview of products which contain nanomaterials could be useful. Many of the risks due to new properties of nanomaterials are not known, and appropriate methods for exposure assessment and for testing are still lacking.

The recommendation of the EU Commission for the definition of nanomaterials⁶² in 2011 can now enhance and target the discussions about associated risks and appropriate regulation. A

⁵⁷ Kortenkamp et al 2011: State of the art assessment of endocrine disrupters, final report http://ec.europa.eu/environment/endocrine/documents/4_Annex%20%20Summary%20of%20Expert%20Consultations%20V2.pdf

⁵⁸ SEC(2011) 1001 final 4th Report on the implementation of the "Community Strategy for Endocrine Disrupters" a range of substances suspected of interfering with the hormone systems of humans and wildlife (COM (1999) 706)

⁵⁹ Stockholm convention <http://chm.pops.int/Convention/ConventionText/tabid/2232/Default.aspx>

⁶⁰ COM(2010) 562 final 3rd progress report on the implementation of the Community Strategy for dioxins, furans, and polychlorinated biphenyls (COM(2001)593)

⁶¹ Council directive 96/59/EG ABI. L 243, 24 September 1996

⁶² COMMISSION RECOMMENDATION of 18 October 2011 on the definition of nanomaterial (2011/696/EU) L 275/38

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lot of research and activities have been or are being carried out by the OECD⁶³, by the EU⁶⁴ and at national levels world-wide. The results should be continuously compiled, evaluated and translated for decision makers, and knowledge gaps should be identified and filled.

New combinations of nanotechnology with biotechnology will have new benefits but unknown associated risks. Therefore risk assessments should be an integral part of the research for innovation in those fields.

As a policy-supporting tool to get a clearer picture of exposure in different population groups and regions, human bio monitoring has started at EU level. This work needs to be continued to provide, *inter alia*, an early warning system, to document the success of measures to reduce exposure and to provide a method which shows the cumulative exposure to a chemical stemming from different sources (internal exposure).

Actions:

Legislation:

- *The Commission should develop policy approaches to tackle risks associated with nanomaterials, chemical mixtures and endocrine disrupters. The Community Strategy for Endocrine Disrupters will be reviewed to provide an adequate policy framework for actions.*
- *An inventory of nanomaterials will be helpful and should be established, to provide an overview of products containing nanomaterials.*

Implementation and measures:

- *Identify substances of very high concern under REACH*
- *Measures should be taken to reduce PCBs and dioxins in food, e.g. recommendations for good agricultural practices to avoid contamination of food and feed.*
- *Measures should be taken to avoid the release of dangerous, persistent chemicals and nanoparticles into the environment at the sources*

Research and innovation

- *Carry out independent basic research on the identification and health impact of new and emerging issues*
- *Develop methods to identify and to assess endocrine disrupters*
- *Develop methods to assess the risk of chemical mixtures, especially for low dose and long term exposure*
- *Identify and quantify sources from POPs, e.g. dioxins and PCBs, in particular the contribution of biomass combustion for energy use*
- *Further quantification of the risks from consumer products – including effects on indoor air quality*
- *Develop methods to measure exposure to nanomaterials and to improve risk assessment for nanomaterials environmental and health impacts*

Communication

- *People should be informed about chemical risks, so that they are aware of the dangers and can make an informed choice, especially vulnerable groups like pregnant women and the elderly. In this context REACH and CLP (classification,*

⁶³ OECD's Working Party on Manufactured Nanomaterials,
http://www.oecd.org/department/0,3355,en_2649_37015404_1_1_1_1,00.html

⁶⁴ <http://www.nanosafetycluster.eu/>

labelling and packaging of substances and mixtures (EC 1272/2008) have a particular role to play and their effective implementation is therefore essential.

4.2.5 Urban design

The great majority of the EU population lives in urban area and the urban populations is continuously increasing. Urban areas can have positive and negative effects on people's health and well-being.

Improvement of urban design is essential to addressing a wide variety of environmental issues – including heat, noise, air and water quality - the promotion of efficient low carbon transport and housing and the encouragement of physical activity by providing a stimulating environment.

Box 3 – Example:

Greening of cities has multiple positive effects on health and well-being

The Impact Assessment Report for the biodiversity strategy⁶⁵ describes the possible positive impact on health and quality of life of green infrastructure in urban areas such as developing and maintaining green spaces, trees, green roof tops and vertical gardens in cities. These include mitigating urban heat islands by cooling the air, aesthetic and psychological benefits and the improvement of water and air quality. Green spaces could have positive influence on health conditions such as obesity, mental health, circulatory disease and asthma. More access to green space for all population groups could also help by reducing health inequalities between socioeconomic groups.

Actions:

- *Tools should be developed and existing tools should be better compiled, assessed, and implemented to promote a more efficient and healthy urban planning*
- *Indicators should be developed to assess positive effects and to measure the benefit of a stimulating environment especially in urban areas*
- *Instruments at the EU level should be provided to facilitate the collaboration at all levels to find and disseminate best practise examples in urban design*

4.3 Cross cutting environment and health actions

4.3.1 Coordination and collaboration on environment and health

Effective work on E&H should continue with coordination reinforced, synergies increased and collaboration strengthened at all levels and in all related areas. Health prevention is a cross sectoral issue: measures are often not under the responsibility of the health sector although they have an impact on health, e.g., activities in resource efficiency, energy, climate change, urban design, and transport.

Environment and health problems which are similar in the various EU Member States can benefit from similar solutions. Therefore, networking and collaboration at EU level, between countries and regions and at local levels, to share information and to learn from experience

⁶⁵ COMMISSION STAFF WORKING PAPER - IMPACT ASSESSMENT SEC(2011) 540 final

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and from best practice would help to make measures effective and would support meeting the requirements of legislation and improving E&H policy.

Coordinated research activities at EU and national level, filling remaining and emerging knowledge gaps on environment and health, can help to direct the funding to the most appropriate research needs. The sharing of European and national research results will avoid unnecessary double work and will better promote transfer of knowledge.

Actions:

- *Building on past activities at EU level, platforms and tools should be provided at EU level to support networking of environment and health experts (beyond the network of researchers) aimed at supporting decision makers, programme managers and public authorities to improve the coordination of E&H research*
- *The collaboration and coordination of E&H activities should be improved, particularly in the field of information exchange, experience sharing and learning from best practices, e.g., to help to find effective measures to meet the targets of legislation.*
- *Collaboration of environment and health experts with experts from other sectors should be strengthened to assess the impact on health and to include environment and health aspects at an early stage of planning in other cross cutting environmental sectors.*

4.3.2 Tools to evaluate measures and actions for the impact on health

As stated at the WHO meeting in Madrid,⁶⁶ there is a lack of tools to assess the impact of policies and actions on health. Agreed and accepted tools and instruments are required to monitor and evaluate the impact on health of activities and measures planned and undertaken, to check the usefulness and success of measures on health, to assess the impact of other sectors on health and if necessary to adapt and improve the activities.

There are however some methods and tools available, such as monitoring programmes for environmental contaminants, i.e., human bio-monitoring (HBM) to analyze the concentration of chemicals in human matrices such as blood, urine and hair, as well as surveys which combine and analyse exposure and additional factors, e.g., via questionnaires. In addition, modelling allows the calculation of the environmental burden of disease (mortality and morbidity) and the estimation of costs and benefit of actions or no-actions.

These methods have different objectives, advantages and limitations. Monitoring programmes show the status of the environment and can give information about the external exposures. Bio banks, as archives of biological samples such as the Environment Specimen Bank in Germany, can show time trends and allow a retrospective analysis of emerging contaminants in stored samples with new methods.

HBM provides information about the internal dose which affects humans. In particular, HBM is important to investigate the exposure to contaminants which are emitted from different sources and taken up via various routes (e.g. oral, dermal, inhalation). It can also provide information about regions or population groups with high contamination levels. Attempts to harmonise HBM and to carry out pilot actions EU wide have started during the former EHAP. Analytical methods and protocols have been harmonised and the experience gained in the HBM harmonisation process shows that HBM is a meaningful tool to help give a clear picture of human exposures. A significant challenge is the assessment of the results obtained, such as the derivation of the levels or thresholds of no adverse effects on health.

⁶⁶ Symposium on Environment and Health Research Science for Policy, Policy for Science: Bridging the Gap Madrid, Spain, 20–22 October 2008
http://www.euro.who.int/_data/assets/pdf_file/0009/97821/E92478.pdf

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The majority of chronic human diseases are likely to result from the combination of environmental exposures to chemical and physical stressors and human genetics; however, the environmental determinants are poorly understood in relation to the genetic factors. Thus, new approaches relying on the concept of the individual 'exposome', representing all environmental contributors to disease received by an individual during a life-time, have been proposed to better understand the underlying mechanisms of environment-health/disease associations. These approaches can be realised by the introduction of the 'omics' technologies (transcriptomics, proteomics, metabolonomics), bioinformatics and epigenetics to the E&H area to investigate environmental exposures and health outcomes in a more systematic and integrated manner.

Epidemiological tools such as surveys have the advantage that more factors and cofounders can be observed which are necessary to explain results, as well as to find factors which influence the impact or to identify aspects which can help take effective actions. Large-scale cohort studies have been funded by the EU research framework programmes on various environment and health issues such as the impact of heavy metals or genotoxic substances on human health. .

Within the framework of the EHAP and EU research programmes⁶⁷, work has been carried out to improve methodologies that can be used by policy-makers to weigh and integrate the impacts on human health - both positive and negative - of high-level, cross-cutting environmental policy issues at EU level. A new framework for integrated environmental health impact assessment (IEHIA) has been proposed, combining two aspects: assessment of health-related problems deriving from the environment, and assessment of health-related impacts of policies and other interventions⁶⁸. The tools should be harmonised and further developed to meet the needs of decision makers. There is also a need for a tool to enable a first quick check about a potential impact on health of a particular cross-sectoral policy.

Methods to estimate the environmental burden of disease (EBD) are useful to quantify the impact on health, not only premature death but also the loss of quality of life through disability. A major limitation in applying these methods is the lack of data, mostly the lack of health data and missing dose-response-functions as well as countable health end-points such as cancer or myocardial infarction. EBD can only be calculated for contaminants where all this information is available, which is often not the case. Therefore, EBD estimations should be evaluated very carefully and used with caution.

Costs of actions and inactions as well as cost-benefit estimations are useful tools for decision makers, particularly in times of economic crisis and tight budgets. But these calculations have even more uncertainties and constraints than EBD methods because they are based on the results from these methods. For using these methods in policy, more research and information is needed to get reliable results.

Actions:

- *Research is needed to fill the knowledge gaps about the links between environmental exposure and health outcomes and to get dose-response-functions which allow reliably quantification the health effects and to identify safe levels of contaminants in the environment and in humans*
- *Innovative molecular biological methods such as "omics" and bio-indicators should be developed and improved to allow fast and low-cost screening and monitoring of exposure and associated health effects.*
- *The methods for modelling, for performing EBD and for cost/benefit analysis should be improved to reduce uncertainties and to estimate the impact of environmental*

⁶⁷ INTARESE www.intarese.org; HEIMTSA www.heimtsa.eu, RAPID http://www.designforhealth.net/pdfs/HIA/BCBS_Rapidassessment_011608.pdf

⁶⁸ <http://www.integrated-assessment.eu/>

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stressors reliably and comparably, as well as to allow realistic cost-benefit estimations to build a sound basis for policy decisions.

- *Research to develop and adapt tools to evaluate the success of policy actions on health and also to provide examples of best practices*
- *Research to develop tools to integrate the influence on health of different policy areas and sectors such as resource and energy policy, biodiversity, spatial planning, urban development and transport with a proactive approach taken such as an integrated health impact assessment at an early stage of planning.*

4.3.3 Extension of environment and health monitoring and information

Taking action in the field of environment and health entails a need for sound information and data. More and specific data are necessary for the assessment of impacts and the evaluation of actions, as well as information about population-based exposures and health outcomes, to build a valid base for performing burden of disease and cost-benefit estimations. In particular, data on relevant health outcomes (incidence, prevalence) are rare but are essential.

The Environment and Health Information System (ENHIS)⁶⁹, managed by the World Health Organisation Europe, should be extended with further indicators which allow the monitoring of the implementation of the time bounded targets of the Parma declaration⁷⁰. Human health and safety is one of the themes tackled upon in INSPIRE (Infrastructure for Spatial Information in the European Union)⁷¹. INSPIRE could be used more widely to encourage sharing of existing geospatial data. The SEIS (Shared Environmental Information System), managed by the European Commission's DG Environment, focuses on the whole chain of environmental information – from collection, processing, analysis to valuable information dissemination and communication. It should be further developed to provide data in a way that it can be accessed, re-used and shared for multi purposes in the E&H area.

Actions:

- *Collaboration between different sectors is needed to adapt monitoring programmes for multi-use purposes in particular for E&H related issues*
- *Data collection should be harmonised and the data availability and access to it should be better enabled and facilitated.*
- *In particular, the monitoring and availability of population based health data (Incidence, prevalence) should be intensified, to help provide a sound data base for E&H assessments and evaluations.*

4.3.4 Targeted research and transfer of knowledge into policy actions

The EHAP fostered the understanding of how certain environmental stressors affect health by focusing and reorienting research (over € 500million have been allocated through the EU research framework programmes over the past ten years)⁷². These research findings should now carried forward into policy actions. The science-policy interface should be improved and specific efforts should be made to facilitate the convert research results into policy-relevant findings.

⁶⁹ <http://www.euro.who.int/en/what-we-do/data-and-evidence/environment-and-health-information-system-enhis>

⁷⁰ http://www.euro.who.int/_data/assets/pdf_file/0011/78608/E93618.pdf

⁷¹ <http://inspire.jrc.ec.europa.eu/>

⁷² EU Commission, European Research Area 2010: Study on the longer-term impact of European Union funding of research in the field of Environment and Health

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In times of economic crisis, available research funding will be limited and access to it mostly done on a competitive basis. Therefore, it is important to improve and strengthen collaboration between researchers and policy makers to get targeted research results which meet the requirements for policy decisions and measures. This is particularly relevant for environment and health because it is a cross-sectoral field and needs strong coordination among the various experts and policy makers involved. Researchers should be aware of the policy needs and how to translate and transfer research results into policy-useful input. By the same token, policy-makers should learn how to ask specific questions so as to get better-targeted results from research.

Actions:

- *Intensify the translation and conversion of research findings into E&H policy*
- *Improve co-ordination and collaboration amongst researchers and policy makers/funders to get better-targeted research, which will facilitate knowledge-based decisions in the E&H policy-making context.*

4.3.5 Integration of social inequity aspects

People with less income, less education or other disadvantages often experience worse environmental quality and health status, which may then result in less resilience to environmental stressors compared to other groups with an average or high social status. These social inequities need to be taken into account in all aspects of environmental policy - related to air, noise and water pollution, urban planning and sustainable development. Development and implementation of environmental actions need to be designed with the intention of obtaining as a minimum an equal distribution of benefits across all social groups and ideally to have greater beneficial effects for those populations with the greatest needs. It requires greater attention to social factors in the development and implementation of environmental policies.

The Rio Declaration adopted by the 1992 UN Conference on Environment and Development recognised that health is at the centre of sustainable development. Sustainable development should lead to a greater improvement in the conditions of those with the greatest needs. It should also facilitate high levels of protection to poorer and vulnerable groups from adverse events arising from negative consequences of development including climate change.

Health inequities are also a main issue of the WHO Parma Conference 2010 and follow-up activities⁷³ and also in the Commission's Communication on "Reducing health inequalities in the EU"⁷⁴.

Actions:

- *Research is needed to identify and investigate factors that generate environmental, social and health inequities and on how to effectively handle and reduce them.*
- *Social and health inequities should be taken into account in urban and rural planning and reduced by adequate measures. The EU's Cohesion policy⁷⁵ should take this into account.*

⁷³ WHO Europe 2010: Social and gender inequalities in environment and health
http://www.euro.who.int/_data/assets/pdf_file/0010/76519/Parma_EH_Conf_pb1.pdf

⁷⁴ COM(2009) 567 final

⁷⁵ EU cohesion policy 2014-2020 <http://ec.europa.eu/inforegio>

4.3.6 Communication and information of citizen

People's behaviour significantly influences environment and health outcomes. People should have easy access to information about environmentally friendly options and healthy life style and behaviour, so that they can make fully-informed environmental and health choices. The information should be targeted towards different population groups.

Actions:

- *At EU level tools should be developed and tested for better informing and educating populations about environment and health issues*
- *Experience and best practices should be shared among policy-makers and other stakeholders at EU- national, regional and local levels*

4.3.7 International collaboration

Health and environment is a global issue. Collaboration on a global scale with WHO, OECD and UNEP is helpful in creating synergies, information exchange and to save costs by avoiding double work and encouraging resource sharing.

In 2010 at the Fifth Ministerial Conference on Environment and Health in Parma, WHO and the 53 member countries of the WHO European Region renewed their support for continuing working on environment and health related issues. In the Parma Declaration⁷⁶ for the first time in history time-bound targets were agreed to reduce threats to children's health from environment impacts. The European Commission itself issued a Declaration⁷⁷ wherein the Commission supports the focus given to key environment and health challenges, such as the impact of climate change on health and the environment, socioeconomic and gender inequalities and the burden of non-communicable diseases linked to environmental conditions and disasters. The Commission will ensure that synergies between EU level actions and those arising from the Parma Conference are fully exploited.

Action:

- *Collaboration as well as coordination of activities and research with international organisations such as WHO, OECD and UNEP should be streamlined intensified, and put in place.*

⁷⁶ http://www.euro.who.int/_data/assets/pdf_file/0011/78608/E93618.pdf

⁷⁷ http://ec.europa.eu/health/healthy_environments/docs/parma_declaration_en.pdf

Annex 1 - Research and innovation for environment and health

Compilation of the research – collected from Chapter 4

Exposure and risk assessment

- Emitters (particularly small sources) of pollutants should be identified and quantified to know the contribution of sources to pollution
- Identification of sources of indoor pollution should be continued to characterise particulate matter indoors as well as their sources.
- Investigation on the health impact of new emerging chemicals should be carried out
- Knowledge gaps about the links between environmental exposure and health outcome should be filled to get dose-response functions, which allow the quantification of the health effects, in particular indoor air pollutants and for combined effect of chemicals in materials and products
- Identification of safe levels of contaminants in the environment and in humans
- The knowledge base should be improved to understand and quantify the contribution of environmental factors to diseases which have an increased incidence, such as diabetes, asthma, allergies, cardiovascular diseases, cancer, reproductive and developmental dysfunctions
- Risk assessment for nanomaterials should be improved

Further development, validation and harmonisation of methodology for environment and health

- Existing tools to assess policy and measures for health impact should be compiled, assessed and implemented, and if necessary new tools developed
- Indicators for environmental, social and health inequities should be identified and applied
- Methods should be (further) developed
 - to measure emission from indoor sources of pollution under real conditions
 - to identify and to assess endocrine disrupters,
 - to assess the risk of chemical mixtures, especially for low dose and long term exposure
 - to measure the exposure to nanomaterials and the potential risks
- Molecular biological methods such as those based on "omics" and new methods and bio-indicators should be developed and improved to allow fast and low cost screening and monitoring of exposure and effects
- The methods for modelling, for EBD and for cost calculation should be improved to reduce uncertainties and to estimate the impact of environmental stressors reliably and comparably, and to allow realistic cost-benefit estimations to build a sound basis for policy decisions
- Research to develop and adapt test tools to evaluate the success of policy actions on health in order to provide best practise examples
- Research to develop tools to integrate the influence on health of different policy areas and sectors such as resource and energy policy, biodiversity, spatial planning, urban

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development and transport with a proactive approach such as an integrated health impact assessment at an early stage of planning.

Positive effects of natural environment and urban design

- The factors should be identified and indicators developed which can show and quantify the positive effects of biodiversity and natural environment, in particular in cities, and to be included in urban planning.

Impact of environment policy of different sectors (energy and resource efficiency) on health

- The knowledge gaps should be filled about the health and environment impact of the use of renewable fuels and biomass used for energy production with a full life cycle assessment with special emphasis on health
- Life cycle assessment should be carried out to investigate the emission of renewable heating materials with a focus on particulate matter (indoors and outdoors).
- The contribution of biomass combustion for energy use to chemical pollution should be quantified

Tackling research results

- Translation of research findings for policy makers and communication of results should be an integral part of the research
- The transfer of already existing research findings into legislation and/or actions, which will reduce the environmental burden of these diseases, should be strengthened
- Research findings and measures to improve IAQ should be reviewed
- Way should be explored to continue and update relevant and helpful information collected in databases or tools during research projects after the end of the projects

Research and innovation

- Knowledge and new technologies are required to reduce emission at the source or use filter techniques
- New innovative technologies should be developed to improve health by accompanying energy efficiency measures, such as intelligent ventilation system for “sealed” houses, efficient heating systems with low particle emission, furniture and building materials with low emissions
- New technology should better enable the use and acceptance for electric cars (reduce air pollution and noise)
- New techniques for water treatment plants (waste water, drinking water) should be developed which are able to clean water from pharmaceuticals and other harmful chemicals