



Coordination of national environment and  
health research programmes

**ERA-ENVHEALTH**



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## Prioritisation criteria to select environment and health issues for joint activities and funding



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**Report summarising the development and application of prioritisation  
criteria and list of prioritised work areas**

**February 2011**

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## WP2: Definition and preparation of joint activities: prioritisation of common strategic issues for trans-national funding

### Task 2.2: Prioritisation of E&H issues for joint activities and funding

#### Deliverable D 2.2.1: Report on the development and application of prioritisation criteria and list of prioritised work areas

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## EXECUTIVE SUMMARY

To maximise the potential for joint funding of common strategic Environment and Health issues across member states, prioritisation criteria are needed, not only at the international level, but also at the national level. In ERA-ENVHEALTH, RIVM together with the ERA-ENVHEALTH partners has developed such criteria.

This report summarises the outcomes of discussions.

The following set of prioritisation criteria has been developed:

1. Links with policy needs
2. Multi/interdisciplinary issue
3. Severity and size of the problem – burden of disease
4. Benefit of international collaboration
5. Public concern

In addition, a Multi-Criteria (MCA) tool has been developed, that allows standardisation of the selection process, among topics but also among the various partners in ERA-ENVHEALTH. The criteria and MCA tool enable structured discussions on the selection of E&H topics and enhance transparency in the selection process.

The ERA-ENVHEALTH consortium will apply these criteria and the MCA to highlight a list of prioritised work areas for ERA-ENVHEALTH partners. In this way, the ERA-ENVHEALTH partners will be able to define the topics for which joint activities can be set up, including for example workshops and knowledge exchange activities as well as those for which an ERA-ENVHEALTH research programme may be launched.

A 3-step procedure is to be implemented in order to firstly get ERA-ENVHEALTH partner organisations to define and prioritise areas in E&H which, for each organisation, would benefit most of transnational collaboration and in what form (through calls or other activities). The idea is to have partners prioritise the list of areas prior to a work session organised in March 2011 and according to their responses create subgroups to work closely together on a joint activity in their common area of interest. The partners in each subgroup can then start using the MCA tool together to prioritise the themes, and topics, if relevant with regards to the chosen activity, under their chosen E&H area, during the work session organised on the 30<sup>th</sup> of March 2011.

## KEYWORDS

ERA-ENVHEALTH, environment and health, prioritisation, criteria, multi-criteria tool (MCA)





## 1. INTRODUCTION

To maximise the potential for joint funding of common strategic Environment and Health issues across member states, prioritisation criteria are needed, not only at the international level, but also at the national level. In ERA-ENVHEALTH, RIVM together with the ERA-ENVHEALTH partners has developed such criteria. These will be applied to the environment and health issues identified in task 2.1 to provide an initial list of prioritised topics. This report summarises the outcomes of these discussions and concludes with a set of prioritisation criteria that can be used by the partners.

Moreover, a multi-criteria tool has been developed, that allows standardisation of the selection process, among topics but also among the various partners in ERA-ENVHEALTH.

Discussions on this matter started during the first meeting to design the Environment and Health ERA-NET in 2004 in Paris. The discussion continued during the process of establishing the working agreement for the now successful creation of ERA-ENVHEALTH 2007 in Brussels.

The first ERA-ENVHEALTH call, for which France, the UK and the Netherlands wrote a joint proposal on the broad topic of climate change, emphasises the need for a clear set of prioritisation criteria to select environment and health issues in a transparent and structured way. The key issue is to match the demands (end-user demands including policy relevance) with the offers (scientific excellence). Knowledge exchange is important, as well as the public value of the research. Furthermore, it is important to know the shared common policy needs. By developing a set of prioritisation criteria, the link between questions of policy-makers and funding of relevant research programmes on environment & health may be improved.

The evaluation of the first ERA-ENVHEALTH call (see the ERA-ENVHEALTH 1<sup>st</sup> call evaluation report June 2010) found that current research call procedures often lack policy relevance evaluation, and the interdisciplinary character of project proposals are often less highly ranked compared to other aspects. Furthermore, certain orphan and taboo issues can be less selected in call procedures. It is important to take into account that shortage in research funding is increasing. Focusing on transnational calls for the distribution of research funds and tackling common problems is even more important nowadays, also because Environment and Health problems have become increasingly complex and are often remote in time and place. Transnational financing provides added-value in terms of budget, scientific excellence and issues which can be tackled. It is within this context that prioritisation criteria need to be defined.

At the workshop during the ERA-ENVHEALTH General Assembly meeting in Rome in September 2009, there was a request on possibilities to weigh the criteria. Multi-Criteria Analysis may be helpful. Possibilities of a Multi-Criteria tool are discussed and illustrated with an example. This method could help in defining which topic is important, according to each partner, and to find partners with similar interests.





## 2. TOWARDS PRIORITISATION CRITERIA

A first inventory of criteria was made during a teleconference with the ERA-ENVHEALTH partners on June 15th 2009. The aim of this teleconference was to gain insight into what prioritisation criteria are important, based on solid arguments, for the different ERA-ENVHEALTH partners.

This resulted in the following list of prioritisation criteria:

- Links with policy needs
- Multi/inter disciplinary co-operation
- Scientific excellence
- Severity and size of the problem – Burden of disease
- Innovation
- Benefit of international collaboration
- Can be communicated easily

In a workshop at the Annual ERA-ENVHEALTH General Assembly meeting in Rome (24-25 September) in 2009, these prioritisation criteria were then further discussed. Comments to the suggested criteria are summarised in textbox 1.





## Textbox 1. Discussion on criteria during the annual General Assembly meeting in Rome (Sept. 2009)

### 1. Links with policy needs:

- Policy needs/relevance: what do they want, what do they need ?
  - Depends on country and organisational needs.
  - Hard to separate – to meet policy-needs, research must be excellent, innovative, etc.
  - 'policy need' – is this something in which politicians have an interest? – this is not always the same as the scientific view of 'need'.
  - The policy in question could be 'research policy' – but for this process, we will focus on prevention and regulation needs.
  - Policy needs can be strategic or legislative based. Need to consider both levels. Strategic needs focus on future issues; legislative needs focus on current needs.
  - Maybe a legislative driver is more powerful as it deals with what is on the table now.
  - This criterion must also include public concerns as a 'need'.
- => *Reasonable criterion, requires elaboration.*

### 2. Multi/inter-disciplinary co-operation

- Consider if the issue is multi/inter-disciplinary.
  - Multi/inter-disciplinary approach may bring more buy-in.
- => *Useful criterion.*

### 3. Scientific excellence

- Needs more clarification.
  - Not a prioritisation criterion, it is for project selection.
  - Need to be clear that there is a scientific question to be answered.
  - May help in identifying low-hanging fruit – i.e. implementable findings.
- => *Remove this criterion from the topic prioritisation list.*

### 4. Severity and size of the problem – Burden of disease

- May not be able to calculate Burden of Disease if not enough data is available – but it is important.
  - Define BoD: wider than using DALYs and QALYs.
  - Remove 'Burden of Disease' from criterion and use judgement of size and severity of problem.
  - But, how to measure this? – incidence, prevalence, mortality -> population impact (use number of people affected). Mirror to policy need (one policy; several policies).
  - Sometimes research is needed for this measurement!
  - Danger of getting 'drowned' in trying to overdefine this criterion.
- => *Useful criterion.*

### 5. Innovation

- Not relevant for choosing topics.
  - But, for emerging issues would be important also resulting from technology development (see size-&-severity discussion above).
  - If a project is 'done' from the scientific point-of-view then social aspects may still be innovative.
- => *Remove this criterion from the topic prioritisation list.*

### 6. Benefit of international collaboration

- Will the work be better if an international approach is used?
  - Sometimes collaboration is needed to get sufficient numbers for studies and some issues are international anyway (transboundary air pollution).
  - But, some issues are local.
  - So... where is the n=benefit? – is it in each country; the world or the research community.
- => *Useful criterion.*

### 7. Can be communicated easily

- Not a reason to follow a research topic.
  - It is relevant for project selection not topic selection.
- => *Remove this criterion from the topic prioritisation list.*

Furthermore, the participants of the workshop suggested adding the following criteria to the list:

- A criteria on exposure
- Usefulness for the broader public
- Availability of earmarked funds
- Equity & Social importance? – key in health but not so much in environment (yet)





### 3. PRIORITISATION CRITERIA

RIVM refined the criteria which were selected during the meeting in Rome, using the Dutch Framework for Decision-making in the Field of Environment and Health (Bruggen & Fast, 2003).

These criteria are to be used as a way to structure discussions on the selection of E&H topics and to underpin decisions on the selection in a transparent way.

It is important, when talking about prioritisation criteria, not to confuse these with evaluation and selection criteria for the proposals submitted to a certain call. Therefore, the following criteria were skipped, further to the suggestions of the workshop participants, because they are more related to project selection than E&H issue prioritisation:

- Scientific excellence
- Innovation
- Can be communicated easily

Other criteria which could play a role in project selection are:

- Are stakeholders, politicians and researchers involved in an early phase of the project to define the needs?
- Will the results be disseminated to the public?

These are discussed in the ERA-ENVHEALTH first call evaluation report.

Furthermore, the proposed criterion 'Availability of earmarked funds' was also removed, because it is more related to fundraising than issue selection. However, it is important to evaluate costs and benefits in a later phase.

The following criteria for issue prioritisation were approved upon during the meeting in The Hague in September 2010.

#### 1. Links with public policy needs

- Does it meet strategic, long-term or legislative, short-term requirements? Both are important; a good overall balance is needed.

Further questions are (Van Bruggen, 2003):

- Are there standards or regulations that require political attention (e.g. the EU Water Directive)?
- Is it possible to tackle the problem and if yes, how (e.g. exposure reduction, legislation ...)?
- Is societal or political pressure to be expected?

- Does it meet public concern (topic-dependent, e.g. for project on electromagnetic fields (high public concern) more important than for a project on air pollution (low public concern).

Further questions are (Van Bruggen, 2003):

- Does the risk influence the feeling of safety?







- Is the risk voluntary and/or controllable?
- Are there other reasons why the risk may be considered as unacceptable?

## **2. Multi/interdisciplinary issue**

- Does the topic under concern require a multi/interdisciplinary approach? E.g. climate change needs such an approach.

For this purpose it is important to have generalist reviewers when reaching the proposal evaluation stage.

## **3. Severity and size of the problem**

- What is known about the severity and size of the problem?

If severity & size of the problem are unknown, this may be a reason to select this topic.

Size, further questions (Van Bruggen, 2003):

- How many people are estimated to be exposed?
- How many people are estimated to become ill or get health complaints?
- Is it likely that the number of exposed and/or affected people will change in the future?
- How much evidence is available for the association between exposure and health impact?
- How big is the problem in the context of all environment & health related problems?

Severity, further questions (Van Bruggen, 2003):

- Which diseases or complaints are expected?
- What health impacts do residents report themselves?
- Who are at risk? Are there particular vulnerable groups?
- How often do the impacts/complaints occur (once per year, continuously...)?
- Is medical treatment possible?

## **4. Benefit of international collaboration**

- What are the benefits of international collaboration? Are they larger than if the project would be performed by a single country/at a national level?

Potential benefits are (Edler, 2008):

- access to and acquisition of leading edge and complementary know how,
- sharing of the costs and risk with international partners, especially when large infrastructures are needed for basic science or product development,
- finding solutions for complex scientific and technical problems that could not be solved with domestic resources alone,
- access to funds from foreign institutions / programmes,





- access to skilled individuals that might have an interest in pursuing opportunities for research in another country (recruiting),
- access to endemic research subjects, such as natural or social phenomena, etc. which are limited geographically,
- desire to influence regulatory regimes or standards.

## **5. Public concern**

- Is the topic a matter of concern or worry, for the broader public? What is the amount of public concern?

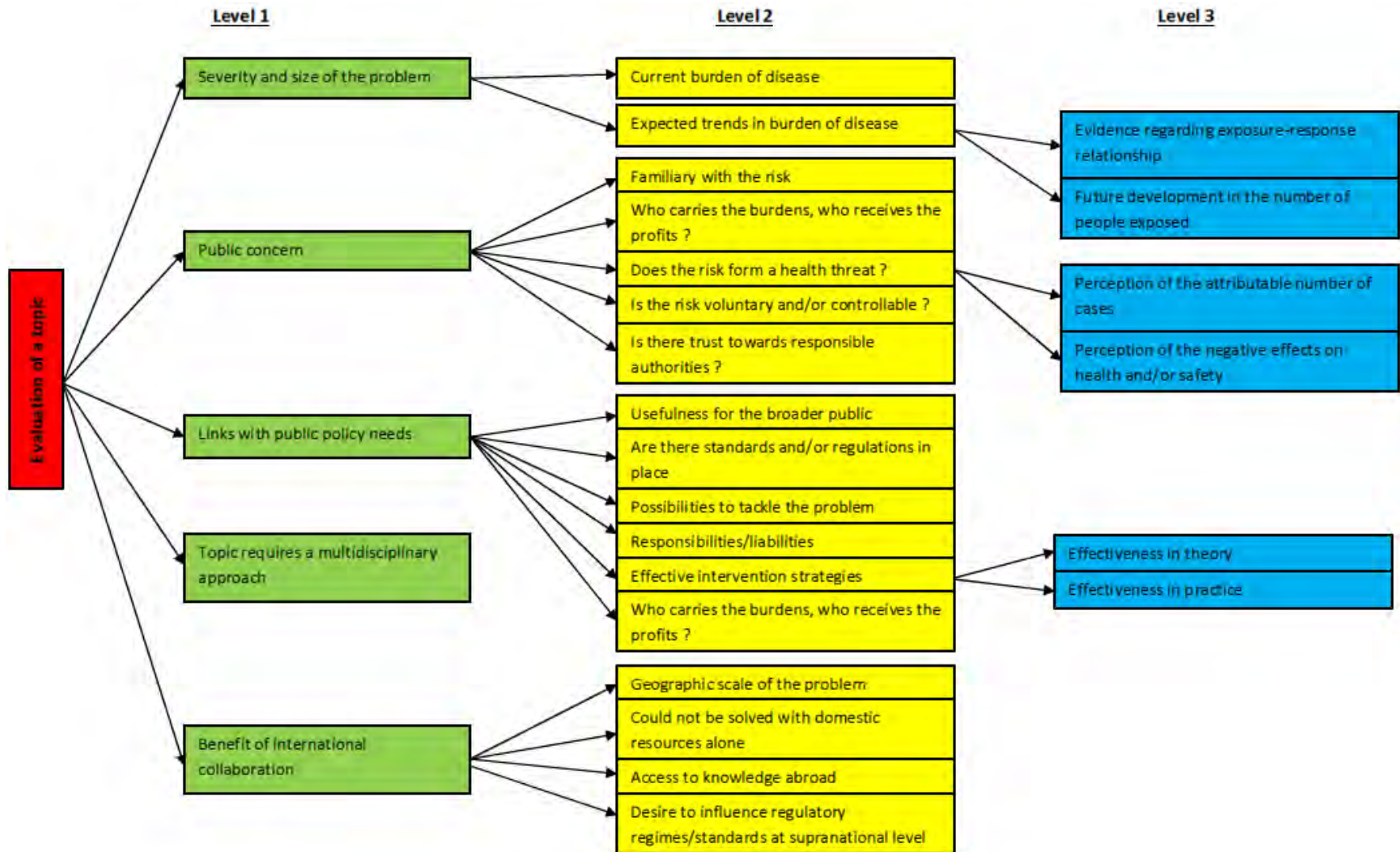
This relates to the equity and social importance of the issue. It also relates to the perception of the risk, the extent to which people perceive a topic as voluntary, are familiar with it or have the idea that benefits are distributed unevenly. It has also to do with distrust in responsible authorities.

Figure 1 presents the criteria schematically, and table 1 explains each element of the scheme.





Figure 1: Schematic presentation of the selection criteria (level 1 to 3)





**Table 1: Explanation of the schematic presentation of the selection criteria (for levels 2 and 3)**

Criterion	Explanation
<b>Level 1</b>	
Severity and size of the problem	What is known about the severity and size of the problem? If severity & size of the problem are unknown, this may be the reason to select this topic (or intervene without evidence – following the precautionary principle).
Public concern	Is the topic a matter of concern or worry, for the broader public? What is the amount of public concern? This relates to the equity and social importance of the issue. It also relates to the perception of the risk, the extent to which people perceive a topic as voluntary, are familiar with it or have the idea that benefits are distributed unevenly. It has also to do with distrust in responsible authorities.
Links with public policy needs	Does the topic meet strategic, long-term or legislative, short-term requirements? Both are important; a good overall balance is needed. Have stakeholders, politicians and researchers met to define policy needs regarding the topic (e.g. in an existing platform)?
Topic requires a multidisciplinary approach	Does the topic under concern require a multi/interdisciplinary approach? E.g. climate change needs such an approach. For this purpose it is important to have generalist reviewers when reaching the proposal evaluation stage.
Benefit of international and multi/interdisciplinary collaboration	What are the benefits of international collaboration? Are they larger than if the project would be performed by a single country/at a national level?
<b>Level 2</b>	
Current burden of disease	Mortality and loss of health which can be attributed to the environmental risk factor under study.
Expected trends in burden of disease	Are there any changes (e.g. policy interventions or demographic changes) which will change the burden of disease in the future?
Familiarity with the risk	If the burden of disease is unknown, this may be a reason to select the topic.
Who carries the burden, who receives the profits?	Relates to equity and social importance of the E&H problem. Both relevant to the public and policy-makers.
Does the risk form a health threat?	Which diseases or symptoms do people or residents report themselves in relation the environmental exposure?
Is the risk voluntary and/or controllable?	Environmental pollution is usually involuntary and difficult to control by an individual. However, the risk might not be rated negatively, e.g. in case it provides economic benefits or when it can be reduced by certain behaviour.
Is there trust towards responsible authorities?	Lack of trust in authorities or lack of public nature of authorities might cause negative rating of the risk.
Usefulness for the broader public	Is the topic useful for the broader public, and not only for research purposes? Relevance for the public does not necessarily relate to the amount of public concern, but also to e.g. relevance of science from a public health perspective.
Are there standards or regulations in place?	Are there standards or regulations that require political attention (e.g. the EU Water Directive)?
Possibilities to tackle the problem	Is it possible to tackle the problem and if yes, how (e.g. exposure reduction, legislation ...)?
Responsibilities / liabilities	Is it possible to define who is responsible for tackling the problem?
Effective intervention strategies	Are there examples of effective ways to tackle the problem?
Who carries the burden, who receives the profits?	Relates to equity and social importance of the E&H problem. Both relevant to the public and policy-makers.
Geographic scale of the problem	E.g. for greenhouse gases, the geographical scale is large. Exposure reduction on a national level will have little effect on climate change





	mitigation.
Could not be solved by domestic resources alone	Multidisciplinary research (the first criterion) may require large infrastructures. International research may give access to funds from foreign institutions/programmes.
Access to knowledge abroad	Leading edge and complementary know how might only be available abroad for specific topics. International research may also give access to skilled individuals that might have an interest in pursuing opportunities for research in another country (recruiting).
Desire to influence regulatory regimes/standards at supranational level	E.g. on the EU level. International research might also have a higher possibility to influence WHO/EU regional frameworks for action, for instance.
<b>Level 3</b>	
Evidence regarding exposure-response relationship	Evaluation of evidence from epidemiological and toxicological studies, e.g. similar effects observed in different populations?
Future development in the number of people exposed	E.g. the number of people exposed to traffic-related air pollution will increase with increasing traffic, but decrease by the introduction of electric cars. What's the net effect?
Perception of the attributable number of cases	What is the size of the problem, from the residents' or people's perspective?
Perception of the negative effects on health and/or safety	What is the severity of the problem, from the residents' or people's perspective? Are the current problems seen as precursors of a catastrophe?
Effectiveness in theory	How much does the topic reduce exposure or prevent disease, in theory?
Effectiveness in practice	When results can be expected, can the interventions be maintained, is the intervention fraud-proof ...





## 4. USE OF A MULTI-CRITERIA ANALYSIS TOOL

The scheme presented on page 13 can guide a weighed selection of an E&H topic in a Multi-Criteria Analysis. Generally, different topics can be selected using a 3-step-approach:

1. Implementing the decision tree
2. Giving scores to the (sub)criteria, i.e. how large is the disease burden? Scoring is based on a scientific literature review and/or expert judgment.
3. Giving weights to the (sub)criteria, e.g. is the size of the disease burden more important than the amount of public concern? The weights are equal for each topic, but are probably different between the ERA-ENVHEALTH partners.

### Implementing the decision tree

The decision tree shows which criteria are used, and the relationships between the (sub)criteria, as shown in figure 1 on page 11. Three levels of criteria can be distinguished with 4 main criteria on the first level, subcriteria on the second level, and sub-subcriteria on the third level.

### Scoring the criteria

Before proceeding, the scores for the environment & health topic under consideration have to be determined. This means that for each topic, data have to be provided for the criteria presented in figure 1. For instance: 'how many people are estimated to become ill because of the environmental risk factor' or 'what is the perception of the negative effects on health'. This can be done by consulting experts and asking them to provide information that is scientifically based or to provide educated guesses. If quantitative data are not available, the criteria can be scored on qualitative scales. Alternatively, it can be decided to limit the scoring to qualitative scales. In a next step, the scores will be standardised, which enables a comparison across different units.

### Weighing factors

These have to be set before projecting the scheme on a topic. By definition the weights given are more or less subjective. They are dependent upon the perspective of those that prioritise. In our example (in Appendix A), all criteria have been given the same weight. The weights only depend on the number of subcriteria - the proportions were divided equally. This means that the four criteria on level 1 each have a weight of 0.25; the 3 subcriteria of criterion 1 each have a weight of 0.33 etc. It is recommended to record the arguments used in the debate on weighing factors, since this may deliver useful insights as well.

### Applying the scheme to a topic

We suggest the use of a Multi-Criteria approach in order to select or to rank a topic for funding. At each level, criteria are weighed for their relative importance.

Example: what do you consider to be more important 'Access to knowledge abroad' versus 'Geographical scale of the problem'?





All criteria at each level are compared with each other and the scores will be combined with the weighing factors. In the end this will result in figures for the level 1 criteria.

In a classic Multi-Criteria Analysis, the topic with the highest total number would be the best to fund.

However, there are several alternatives to this strict approach, such as only considering level 1 results for instance, or evaluating results on each level separately. It is possible to perform a sensitivity analysis on the weights and the scores.

It is important to keep in mind that MCA is just one of the tools used to support a funding decision.

This method could help in defining which topic is important, according to each partner, and to find partners with similar interests. RIVM could provide the first and second step, for a selection of topics, and partners could be asked to fill out a questionnaire to provide weights (third step). RIVM could perform the analysis, or alternatively, partners could perform all steps themselves.

In appendix A, a Multi-Criteria Analysis on three E&H topics is shown as an example.





## 5. DISCUSSION

This report presented a list of prioritisation criteria and a Multi-Criteria tool for the selection of Environment and Health topics within ERA-ENVHEALTH. Application of the criteria within this project will reveal if they are useful and complete. The criteria should be used carefully and probably adapted to specific subjects. Evaluation of this set of criteria is therefore important.

It is important to make a distinction between prioritisation criteria for project selection and prioritisation for topics – which is to decide on which topics we should focus the joint activities and in particular funding and launching calls. This report focused on prioritisation for topics. However, not all prioritisation criteria are relevant for all topics.

The Multi-Criteria Analysis enables people to attach different weights to different criteria, according to their specific interests. It is important to know how these criteria will be used, and in what way they will be assessed. Is it a judgement by one person, or all together? Again, the discussion on what weight for what criterion may be worthwhile in itself, since it reveals the opinions of people in a transparent way. Therefore, the arguments people use for the weights they give are worthwhile to document.

The question is also for whom it is relevant to have these weights. It may be a way to find common denominators to bring organisations together with harmonised interests. However, assessing and harmonising weights may be difficult. For example, what criteria are most important to scientists may differ from what is most important to policy-makers, and what criteria are most important for people from Eastern Europe may be different from what criteria are most important for people from Western Europe. If each group applies criteria to their own topics, each group will come together on their own priorities. While this set of prioritisation criteria and the multi-criteria tool may help to structure the selection of the most important environment & health topics for funding and reveal the underlying arguments, the procedure behind it is as important.

At the workshop in Rome in September 2009 and further to the evaluation of the ERA-ENVHEALTH first call, it is commonly agreed that more formal arrangements between funding organisations are needed and call procedures for interdisciplinary research are needed. Often current research call procedures lack a specific policy evaluation component. Tender procedures may be a solution, but often lack the expertise of the funding agencies and lack the scientific peer review. A mix of both calls and tenders depending on the specific topic and funders could be envisaged. This is also discussed in the first call evaluation report. However, it takes time to develop research call procedures. Therefore for the short term (1-5 years) it is important to take into account scientific signals regarding environment & health (e.g. SCER/SCENIHR) and to match funding possibilities (such as using “policy hypes”). For the longer term (5-10 years) it is important to address the multidisciplinary gaps, design an environment & health policy need and research supply programme, define







the required methodology (with the research community), and secure funding and preferably create a trans-national ERA-ENVHEALTH funding procedure.

By applying the prioritisation criteria, partners in ERA-ENVHEALTH will be able to define the topics for which joint activities can be set up, including for example workshops and knowledge exchange activities as well as those for which an ERA-ENVHEALTH research programme may be launched. Partners with similar funding opportunities and interests may find it easier to work in a transnational partnership, using calls or tender procedures, to respond to their current requirements.

Hence, the second step of this work is to apply these criteria and the MCA within the ERA-ENVHEALTH consortium to highlight a list of prioritised work areas for ERA-ENVHEALTH partners.



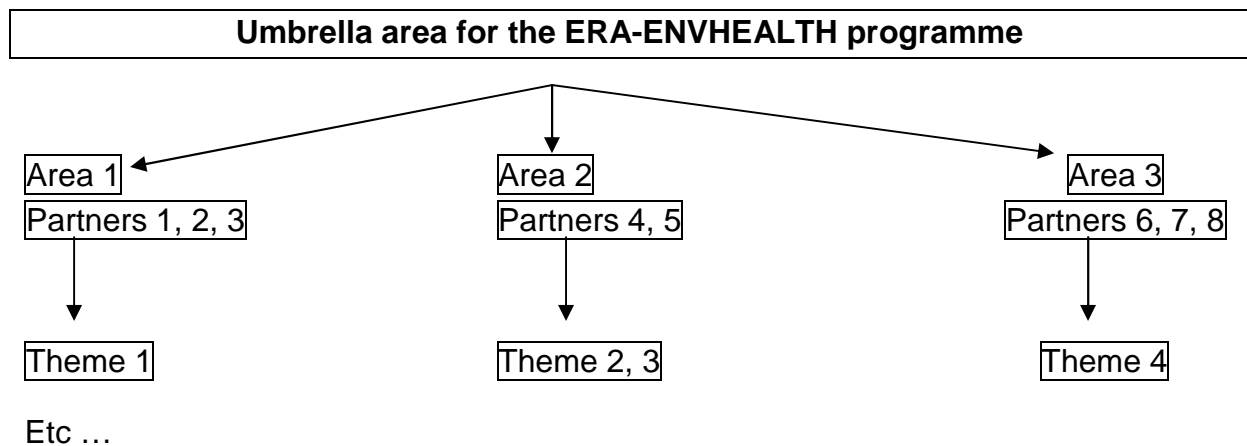


## 6. APPLICATION OF THE CRITERIA AND MCA TOOL WITHIN ERA-ENVHEALTH

In order to get an “ERA-ENVHEALTH list of prioritised areas” that can be used by the project to implement joint activities it is important to define the procedure used to apply the criteria and who is to apply them.

It is also important to keep in mind the finality of the application: to find areas of common interest to launch joint activities.

It is not thought that finding 1 topic of common interest to all partners is the correct way forward. However, as stated in the 1st call evaluation report entitled “Report on the management and scientific evaluation issues encountered during the 1st call”, an umbrella area must be defined under which sub-groups of partners (2 to 4 partners maybe) with similar interests (topics) can be created and work together on their joint activity.



An *area* is defined as a field in Environment and health, such as: outdoor air quality, indoor air, social inequalities, climate change, chemical agents, cancer ... The area is to be the focus of the E&H question.

A *theme* is defined as a subdivision of an area, such as: air pollution and links to myocardial infarction, perchlorates in water, the health effects of school indoor air quality particularly in relation to respiratory diseases, particulates including nanoparticles from hazardous waste incineration ...

A *topic or call specification* is defined as a subdivision of a theme, such as the topic defined for the 1st call: health vulnerability resulting from future climate change impacts on soil-water ecosystems, land use and water resources at regional scale ... It is the specific topic agreed together by the funding partners. This level will only be reached for specific activities such as funding calls or tenders.





### **A 3-step procedure will be implemented:**

1. All partners of ERA-ENVHEALTH are to apply the 1st level of the MCA tool to prioritise the E&H areas defined under WP2 in the report entitled: "Report on programme strategic issues, complementarities and clustering arrangements", and including their organisation's priorities if not already mentioned. This first step will be performed by means of an on-line questionnaire (available from March 3rd until March 16th). This 1<sup>st</sup> step will provide a list of prioritised areas for the ERA-ENVHEALTH partners. Results will be reported back to the participants at the end of March 2011.
2. At a work session (organised Wednesday March 30, 2011) sub-groups of partners with a common interest in one or more areas will be created according to the common priority areas found and each subgroup of partners will rank together the themes defined under their area and discuss the type of joint activity they wish to take forward.  
→ To be completed during the work session on the 30<sup>th</sup> of March 2011
1. When the activity to be launched is a call, each subgroup of funding partners then applies together all 3 levels of the MCA tool to the topics defined under their theme or themes to precisely define their call specification.  
→ To be completed according to a common calendar

### **Prioritisation exercise:**

The list of prioritised areas for ERA-ENVHEALTH activities will only be definite after the work session on March 30<sup>th</sup> 2011, when all partners have discussed the results.

Three choices can be provided according to the "investment" each partner is interested in:

1. Knowledge exchange, workshop i.e. low or no cost activities
2. Contribution in kind i.e. evaluating proposals, sitting on steering committee, supplying data or information
3. Funding a call (call for proposals or tender)

### **Application of the MCA**

In the ERA-ENVHEALTH exceptional General Assembly meeting on 28-30 March 2011 in Paris, work sessions have been planned with the goal to define Environment & Health areas for collaborative work and make a prioritisation of the themes in each sub area. In order to assist this process RIVM suggested using a Multi-Criteria Analysis approach. In this approach the top level criteria are:

- Severity & size of the problem in terms of (future) burden of disease
- Public concern (worry)
- Links with policy needs (regulation, responsibilities, possibilities, evidence)





- Benefit of multidisciplinary approach
- Benefit of international collaboration

A questionnaire has been prepared by RIVM. It aims to gather the data that are needed for this exercise.

The idea is to have partners prioritise the list of areas prior to the work session by means of the internet questionnaire and according to their responses create subgroups (during the work session) to work closely together on a joint activity in their common area of interest. The partners in each subgroup can then start to use the MCA tool together to prioritise the themes, and topics, if relevant with regards to the chosen activity, during the work session organised on the 30<sup>th</sup> of March 2011. The prioritisation exercise should be done bearing in mind the areas which, for each organisation, would benefit most of transnational collaboration and in what form (through calls or other activities).

The **questionnaire** is available through a web-based interface:

<http://www.formdesk.com/rivm5/ERA-ENVHEALTH-D221>

It will be available starting March 3rd and will be closed March 16th.

It starts,

1. After an INTRODUCTION and some MORE ABOUT YOURSELF, with:
2. RANKING THE CRITERIA on which the research areas will be evaluated,
3. Possible ADDITIONAL AREAS not mentioned yet are explored, followed by
4. The EVALUATED AREAS on the 6 criteria (6 times for each criterion all research areas are evaluated).

The results of the questionnaire will provide information on:

- the relative importance of the criteria, and
  - the evaluation of the areas according to the criteria.
- These two combined and added gives the utility of each research area.
- The data will also give the opportunity to assess which institutes have similar interest on which areas.

The information thus collected is not meant to steer but to structure and to be of use in the discussion during the work session end of March.

As for several of the criteria in the RIVM-tool the data are missing or will require disproportionate efforts to obtain; it was decided to rely on expert elicitation to solve this issue. This means that the ERA-ENVHEALTH partners are asked to provide their





idea about the importance of the five criteria for environmental health risks in the ERA-ENVHEALTH context. Secondly, they will be asked to provide the scores of environmental health areas on the criteria. The combinations of the fixed weights for criteria in this context and the scores that are different for different areas will result (weighted summation) in a single figure for a risk. These figures can be sorted and as a consequence a prioritisation of topics results.

When the partners have completed the questionnaire the data will be sent to RIVM, who will calculate the prioritisation for the partners and send them an excel-file with results (tables, bar charts). This may also help the partners to reflect on their own priorities.

Moreover, the data will be used to calculate an aggregated prioritisation and will be used to examine whether there are partners with similar interests. The aggregated results and the contributions of the partners will be presented at the meeting on the 30<sup>th</sup> of March 2011.

The results of the exercise will be used during the meeting to also start on step 2 of the exercise to prioritise the themes within the prioritised areas.

It is clear that the success of this MCA experiment is highly dependent upon the partners' cooperation. Therefore, they are encouraged to fill out the survey prior to the March meeting.





## REFERENCES

Edler, J. The role of international collaboration in the framework programme. Expert analysis in support of the ex post evaluation of FP6.

Manchester, Manchester University, 2008.

[http://ec.europa.eu/research/evaluations/pdf/archive/fp6-evidence-base/expert\\_analysis/j.edler\\_-\\_the\\_role\\_of\\_international\\_collaboration\\_in\\_the\\_framework\\_programme.pdf](http://ec.europa.eu/research/evaluations/pdf/archive/fp6-evidence-base/expert_analysis/j.edler_-_the_role_of_international_collaboration_in_the_framework_programme.pdf)

[the role of international collaboration in the framework programme.pdf](http://ec.europa.eu/research/evaluations/pdf/archive/fp6-evidence-base/expert_analysis/j.edler_-_the_role_of_international_collaboration_in_the_framework_programme.pdf)

*Accessed June 3, 2010*

BONUS SKEP ERANET evaluation criteria:

[http://www.skep-era.net/site/files/WP3\\_trans\\_Kaisa%20Kononen\\_BONUS.ppt#1](http://www.skep-era.net/site/files/WP3_trans_Kaisa%20Kononen_BONUS.ppt#1)

*Accessed June 3, 2010*

Van Bruggen, M., Fast, T. Beoordelingskader Gezondheid en Milieu [framework for decision making in the field of environment and health]. Bilthoven, RIVM, 2003 (report no. 609026003).





## APPENDIX A: Application of the instrument in choosing between three environment and health topics

In order to show the possibilities of a Multi-Criteria Analysis we use the instrument to support a funding decision in which 'noise by road traffic', 'EMF by mobile phone antennas' or 'indoor radiation by Thoron/Radon' are one of the alternatives. For this purpose we use the MCA-package DEFINITE (Decision support system for a FINITE set of alternatives) version 3.1. For this software package we can provide a template that can be used by the ERA-ENVHEALTH partners.

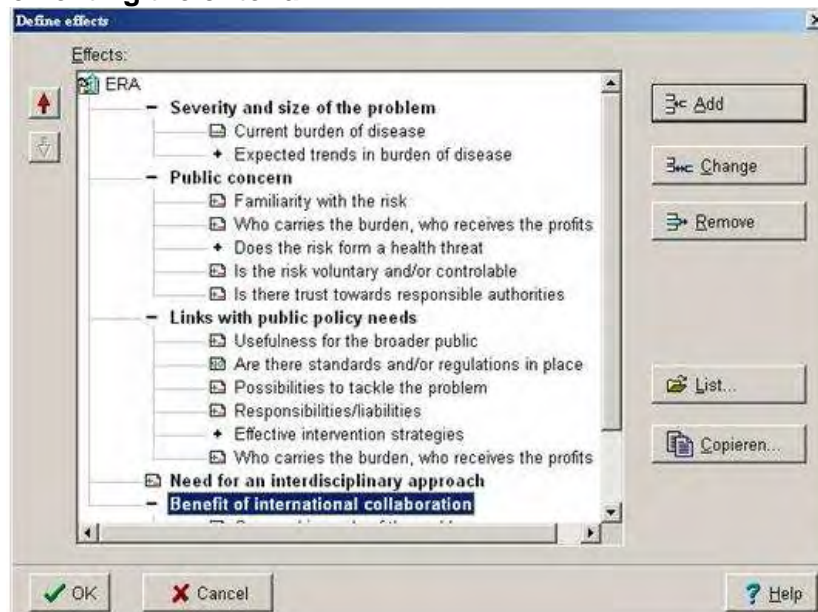
Note: in the present version, default weights are provided, but these need to be agreed upon by the ERA-ENVHEALTH General Assembly.

This approach becomes applicable only after specific topics of a theme within an area have been defined and studied.

### Step 1: Implementing the decision tree

The first step in the analysis is implementing the decision tree with the criteria, as presented during the ERA-ENVHEALTH meeting in The Hague in September 2010 (figure 1 page 11), in the software package. In figure A, a screenshot of this process in DEFINITE is provided.

Figure A: Implementing the criteria in DEFINITE



In this figure level 1 criteria are printed in bold, below these criteria the level 2 criteria are provided. A + indicates that the view can be expanded to see the level 3 criteria. The symbols in green and red before the criteria indicate what type of scale will be used to score the criteria. For this analysis the DALYs (Disability Adjusted Life Years, an aggregate measure to express the burden of disease) will be scored on an interval scale, the criterion about standards and regulations will be scored on a binary scale and all other criteria will be scored on +/- scales.





### Step 2: Scoring, i.e. how big is the problem, and standardising

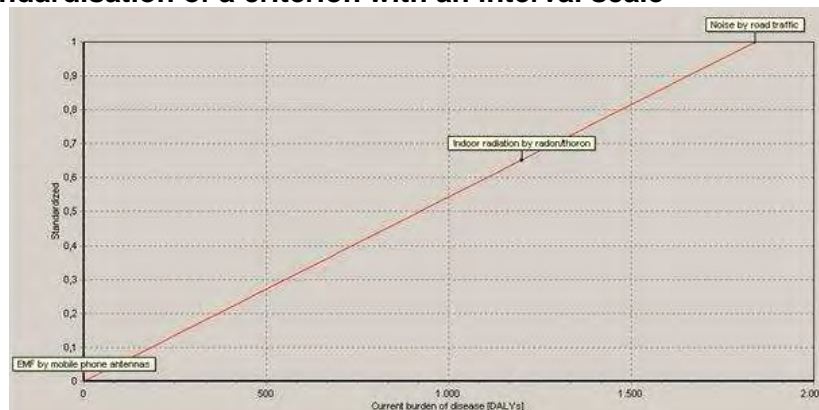
After the matrix for the scores has been designed, the actual scoring process takes place. Scoring means that one indicates how large the disease burden is, how much the topic is surrounded by public concern, etc. Initially DEFINITE comes up with an empty matrix in which all scores are set to zero. After filling out the scores the so-called effect table looks like the screenshot in figure B. The crucial point is of course the basis of the scores used. In appendix B, the scores and line of reasoning behind them for each effect/criterion are provided.

After the scores have been filled-out, they have to be transformed in order to be able to use them in the aggregation process. Several types of standardisation are possible, but for our purposes simple interval standardisation is appropriate. In figures C and D standardisation for both an interval variable (current burden of disease) and a +/- variable (evidence regarding the dose-response relationship) is illustrated. The assumption is that there are equal intervals between the scores. As a consequence the standardised values (0-1) can be derived.

Figure B: Scores in DEFINITE

	CB	Unit	Indoor radiation by radon/thoron	Noise by road traffic	EMF by mobile phone antennas
<b>Severity and size of th</b>					
Current burden of disease	+	DALYs	100	1940	0
<b>Expected trends in burde</b>					
Evidence regarding ex			0	+	+++
Future development in			+	+	0
<b>Public concern</b>					
Familiarity with the risk			+++	++	++
Who carries the burden,			-	+	++
<b>Does the risk form a heal</b>					
Perception of the attri			0	++	++
Perception of the negi			0	++	++
Is the risk voluntary andk			++	+	++
Is there trust towards res			-	+	+

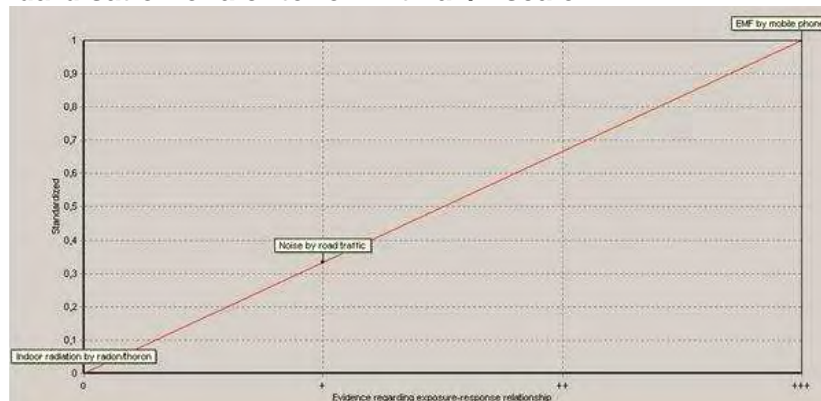
Figure C: Standardisation of a criterion with an interval scale







**Figure D: Standardisation of a criterion with a +/- scale**



**Step 3: Providing weights, i.e. how important is each criterion**

The next step in the process is to fill out the weights, which means that one indicates how important each criterion is, relative to the other criteria. In this example, all criteria were given equal weights. Figure E gives an overview (first two effects only) of the weights at the different levels and the resulting combined weights. It is important to realise that these weights are the same for all alternatives. So there is one set of weights that is applied on all topics.

**Figure E: Providing weights in DEFINITE**

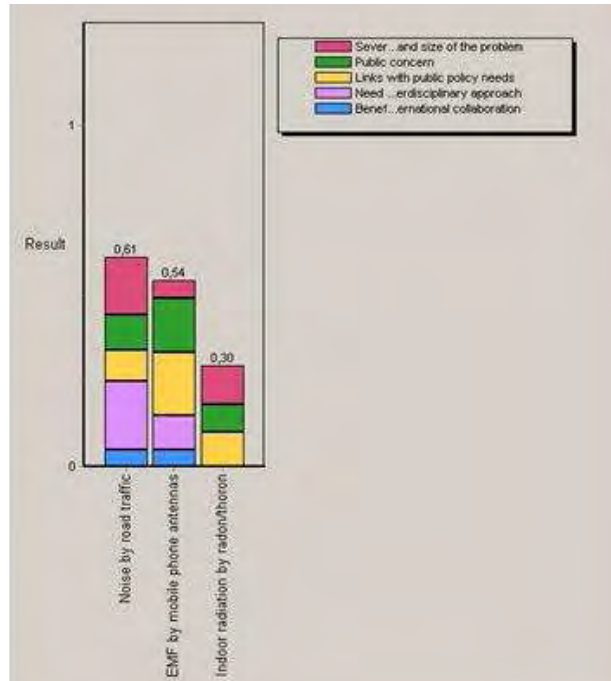
	C/B	Unit	Standardization method	Minimum Range	Maximum Range	Weight level 1	Weight level 2	Weight level 3	Weight
<b>Severity and size of the effect</b>									
Current burden of diseases		DALYs	<input checked="" type="checkbox"/> interval	0	1040		0,500		0,100
<b>Expected trends in burden</b>									
Evidence regarding exposure-response relationship		0/++++	<input checked="" type="checkbox"/> interval	0	+++			0,500	0,050
Future development in risk		---/+++	<input checked="" type="checkbox"/> interval	0	+			0,500	0,050
<b>Public concern</b>									
Familiarity with the risk		0/+++	<input checked="" type="checkbox"/> interval		++	+++	0,200		0,040
Who carries the burden, and how		---/++	<input checked="" type="checkbox"/> interval		-	++	0,200		0,040
<b>Does the risk form a health problem</b>									
Perception of the attribution		0/+++	<input checked="" type="checkbox"/> interval	0		++		0,500	0,020
Perception of the responsibility		0/+++	<input checked="" type="checkbox"/> interval	0		++		0,500	0,020
Is the risk voluntary and avoidable		---/++	<input checked="" type="checkbox"/> interval		+	++	0,200		0,040
Is there trust towards responsible parties		---/++	<input checked="" type="checkbox"/> interval		-	+	0,200		0,040

**Step 4: Results of the weighted summation**

At this point in the process the weights and the required standardised scores are obtained. Consequently, the weighted summation can be calculated. Figure F shows the results of the weighted summation and shows the effects that make up the total score. Because the criteria were given equal weights in this example, the summation reflect differences in scores only.



**Figure F: Results of the weighted summation**



The figure shows that ‘noise by road traffic’ has the highest score, ‘indoor radiation by Radon/Thoron’ has the lowest score and ‘EMF by mobile phone antennas’ takes the middle position. The colours in the column show their composites. For ‘noise by road traffic’, ‘severity and size of the problem’ and ‘need for an interdisciplinary approach’ are relatively important components. For ‘EMF by mobile phone antenna’s’, ‘links with policy needs’ and ‘public concern’ are relatively important of the level of the result.

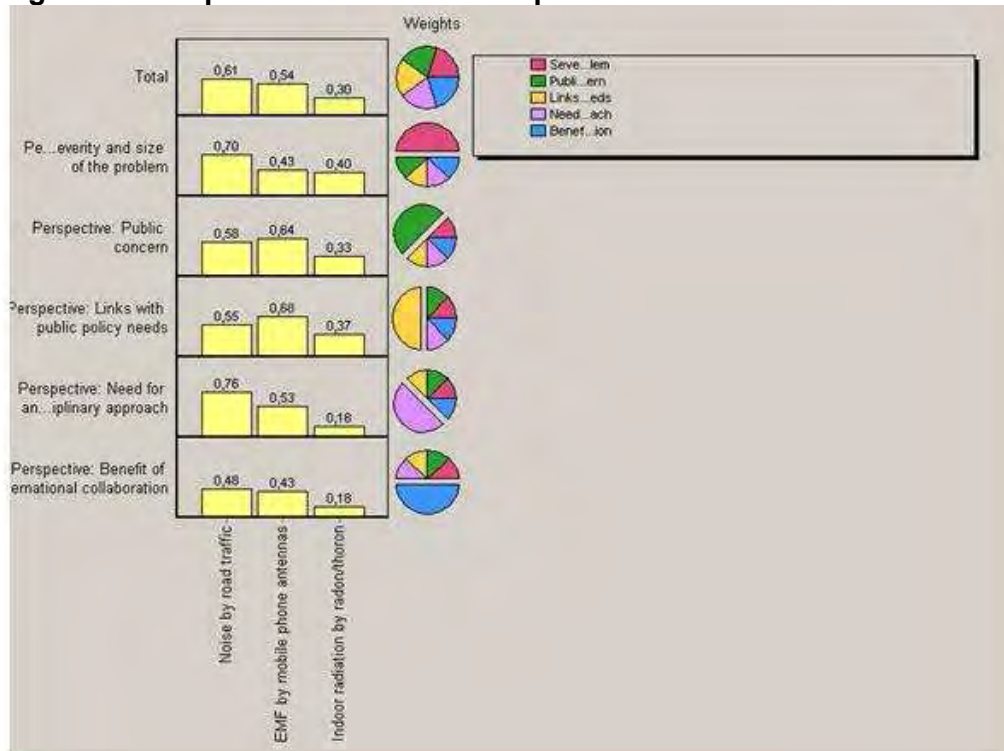
### Optional Step 5: Sensitivity analysis

Remember that the results of the weighted summation are obtained by using the defaults weights in which all effects are considered as equally important. An interesting question is: what would happen if one of the effects (e.g. severity and size of the problem) is considered as the most important one. DEFINITE can show this by providing perspectives. In a perspective, half of the weight (0.5) is given to one of the level 1 criteria/effect and the other half (0.5) is distributed equally over the remaining level 1 effects.

In figure G the different perspectives as calculated by DEFINITE are provided. The figure illustrates clearly that MCA-packages like DEFINITE are intended to support decisions and the discussion about them, but that the actual decision is part of the policy process.



**Figure G: Perspectives on the three topics/alternatives**



The first row from above shows the results that are obtained when all weights are set equal. This is shown by the equal parts in the weights pie chart at the right hand site. In the second row from above the perspective ‘Severity and size of the problem’ is calculated. According to this perspective ‘noise by road traffic’ is more important than in the basic results and the differences between ‘EMF by mobile phone antennas’ and ‘Indoor radiation by radon/thoron’ are getting smaller.

From the perspectives of ‘Public concern’ and ‘Links with public policy needs’ it follows that if more weight is given to these criteria the ranking will change and ‘EMF by mobile phone antennas’ will become more important than ‘noise by road traffic’. According to the perspective ‘need for an interdisciplinary approach’, ‘noise by road traffic’ grows a little in importance, while ‘indoor radiation by radon/thoron’ becomes less important. When half of the weight is given to the criterion/effect ‘benefit of international collaboration’ the topics ‘noise by road traffic’ and ‘EMF by mobile phone antennas’ reach approximately the same level, while the topic ‘indoor radiation by radon/thoron’ is clearly less important.

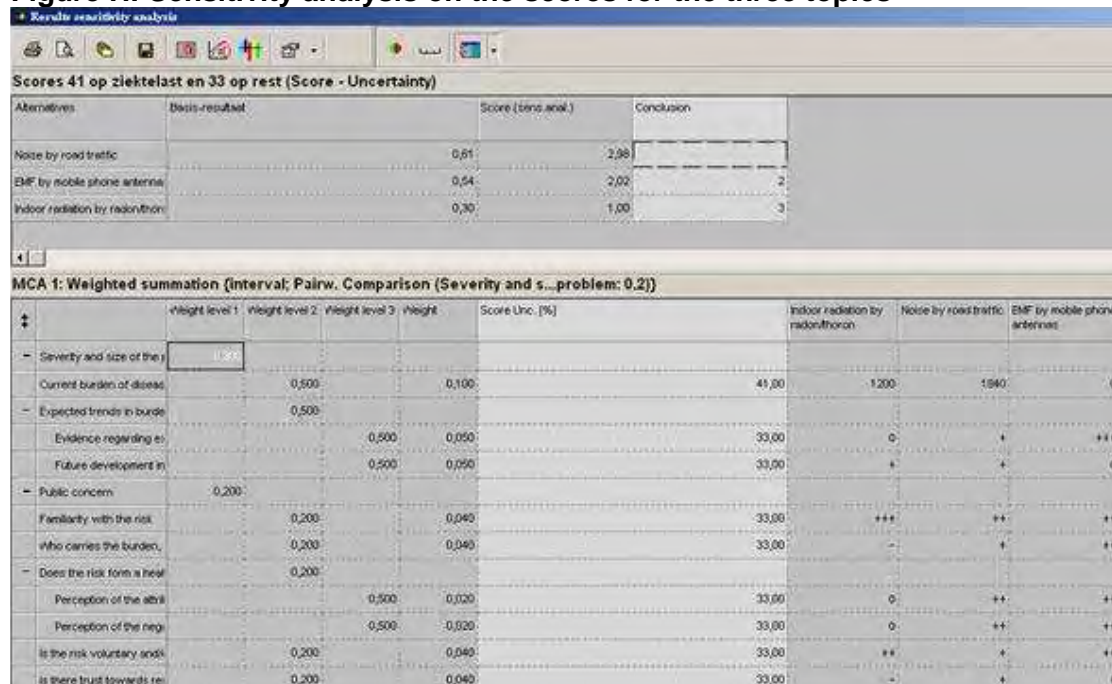
Another relevant question for a sensitivity analysis is of course: ‘What would happen if the data we base our analysis on, i.e. the scores, are more or less uncertain?’ In order to answer this question DEFINITE uses Monte Carlo analysis.

Figure H shows the outcomes of a sensitivity analysis in which we stated that the uncertainty on the current level of burden of disease is 41 percent and all other scores have an uncertainty of 33 percent. The uncertainty on the current burden of disease is based on the uncertainty intervals of the DALYs of ‘noise by road traffic’ and ‘indoor radiation by radon/thoron’. The uncertainties on the other scores are an assumption. The conclusion of the analysis shows that the uncertainties in the scores provided do not change the ranking that was initially calculated with all weights at the same level.





**Figure H: Sensitivity analysis on the scores for the three topics**



**Use of a spreadsheet or a MCA software package**

Although the calculations may look advanced, actually everybody with a spreadsheet can reproduce them. Even the interval standardisation can easily be done with a spreadsheet. Sensitivity analysis with Monte Carlo simulation is a step that cannot be performed following this approach, but might be done with a software package for sensitivity analysis.





## APPENDIX B: Scores

### Introduction

An important step in a Multi-Criteria Analysis is the attribution of scores to the several criteria. These scores can have different origins: they can be inferred from literature, may be the result of expert judgment or be a combination of both. For topics that have a weak knowledge base, expert judgments in combination with scientific findings can do the job.

This approach becomes applicable only after specific topics of a theme within an area have been defined and studied.

In our application we use expert judgments in combination with scientific findings as the basis for our scores. The information needed was for a large part gathered by Fast & Van Bruggen (2004) in the context of the appraisal framework health and environment. This framework consists of 26 questions about an environment and health risk. The answers provide relevant state-of-the-art information to policy-makers. In order to obtain the information needed Fast and Van Bruggen consulted expert panels (often more than 10 members) that provided contributions and commented the information by other panel members.

As the information provided by Fast & Van Bruggen does not match completely with the ERA-ENVHEALTH scheme, the additional information was provided by experts at the RIVM centre for Environmental Health Research.

#### - Severity and size of the problem

##### **Current burden of disease**

A problem with scores for severity and size is that the number of people that are sick or dead is not a good indicator for the disease burden. Problems with this approach are that it is difficult to indicate how severe a certain disorder/complaint is. Moreover, there are often several health effects which cannot be added up easily. Furthermore, the number of people who died is a heavily debated criterion. It is better to use decreased life expectancy as a consequence of environmental factors. A criterion which takes these aspects into account is the DALY: Disability Adjusted Life Years. In this measure, the number of people with health effects, the severity of these effects and the duration of the effects are taken into account.

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	1200 DALY's	According to Knol & Staatsen (2005, p. 96) radon is responsible for a disease burden of 1200 (650 – 1800) DALY's per million Dutch residents.
Noise by road traffic	1840 DALY's	Knol & Staatsen (2005, p. 96) report 2300 (1100-4700) DALY's per million Dutch residents for the year 2000 on basis of the Miedema dose-response curves for the total disease burden of long-term noise exposure. If we assume that noise by road traffic is responsible for 80 percent of these DALY's, this results in a disease burden of 1840 DALY's.
Antennas mobile phones	0 DALY's	There are no diseases or deaths known that can be attributed to Electromagnetic Fields.





### **Expected trends in burden of disease**

As a consequence of previous measures the exposure might be beyond its highest point or as a consequence of societal developments or a lack of measures the exposure may grow. What is the net effect of developments? To indicate whether the burden of disease will increase or decrease, --/++ (strongly decreases-strongly increases) can be used.

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+	In new(ly built) houses the radon concentrations are in general higher than in older dwellings. This is predominantly caused by improvements in the insulation of houses that started in the seventies. Another less influential cause is the use of other more stony material. Despite of the fact that efforts are made to improve ventilation and use less radiating building materials, the expectation is that the average exposure per resident will increase gradually in the years to come (Fast & Van Bruggen, 2004, p. 50).
Noise by road traffic	+	In the past few years both the noise exposure and nuisance by road traffic has increased. The expectations are that in the coming years these aspects will continue to increase despite the fact that cars are getting more quiet. This is the consequence of the expectations that the amount of traffic, especially on main roads, will grow steadily (RIVM, 2003b).
Antennas mobile phones	0	The number of people exposed above the current level may increase as a consequence of increasing use of mobile communication systems. As a consequence, a larger demand for capacity more antennas may be needed. New antennas can (to a limited extent) be added to the existing sites. If that is not possible new antenna sites are needed. The results will be that there will be more connections in the network and the size of the service area and the level of radiation will decrease. As consequence, the exposure will change. As there is no information about the future siting of antennas, it is not possible to say something about the direction (Fast & Van Bruggen, 2004, pp. 16-17).

### **Evidence regarding the exposure-response relationship**

Example: there is certainty about the relation between smoking and lung cancer, despite the fact that not every smoker gets this disease. There is however high uncertainty about the causality of the relation between living near electric power lines and leukaemia in children. The strength of the exposure-response relationship can be scored from very weak (0) to very strong (+++++).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+++++	The risk estimations for radon are based on a combination of radiobiological mechanical studies, experiments with laboratory animals, epidemiological studies and biophysical modelling. Therefore, it can be concluded that there are no carcinogenetic agent with better/stronger estimations (BEIR VI, 1999).
Noise by road traffic	++++	<i>Nuisance</i> The relations between nuisance by noise and the noise exposure of the fronts of houses are accepted for the European noise policy as the best available to date. Non-acoustic factors can influence this relationship significantly. This explains partly why in specific situations deviations of the prevailing dose-effect relationships have been found (Miedema & Oudshoorn, 2001; Fast et al., 2004, p. 81). <i>Sleep disturbance</i> Although there is abundant evidence that noise can cause sleep disturbance, the effect level of severe sleep disturbance is not known yet. In the mean time one assumes that this is approximately at L <sub>night</sub> =43 dB(A). <i>Cardiovascular diseases</i>





		RIVM estimates that for noise by road traffic the relative risk per 5 dB(A) for myocardial infarction incidence in men is 1,06 (95-% BI: 1,01 - 1,11) (Van Kempen & Houthuijs, 2008, p. 13). It is not exactly known above which sound levels effects may appear. In general one assumes that increased blood pressure and ischemic heart diseases can occur when a twenty-four hour average exceeds levels of 65-70 dB(A) (Van Kempen et al., 2002).
Antennas mobile phones	++	The dose-effect relationship for the thermal effects is well-known, but these effects cannot be expected in everyday surroundings. Moreover, there is, at the moment, no relationship with the incidence or promotion of cancer. There are however indications that a relationship exists between living near a GSM base station and complaints about health consequences and well-being. Currently it is not possible to prove a causal relationship (Gezondheidsraad, 2000).

- **Public Concern**

***Familiarity with the risk***

To what extent are people familiar with the risk? As the familiarity of people with the risk increases, the score on the scale also increases. The scores can run from absolutely unfamiliar (0) to completely familiar (+++).

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	In general, people in the Netherlands are not acquainted with and are not aware of the risk of indoor radiation by radon/thoron.
Noise by road traffic	+	Although almost everybody is familiar with the fact that noise by road traffic causes nuisance, much less is known about the potential influence of noise on blood pressure and ischemic heart diseases.
Antennas mobile phones	+	Among part of the population it is known that there is a public discussion about the potential negative effects of UMTS antennas on health. There are several internet discussion fora about this subject.

***Who carries the burden, who receives the profits***

Environment and health risks can be distributed in a fair or an unfair way. This means that we can speak about distributive fairness. An example of an environment and health risk that has been distributed in a fair way is the risk of cancer as a consequence of exposure to sun. This is a result of the fact that everybody is exposed in the same way. An example of an environmental risk that is not distributed fairly is air pollution by industry. In this case local residents carry the burden, while a lot of others (consumers, employees, managers) receive the profits. This criterion can be scored from very low distributive fairness (--) to very good distributive fairness (++)

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+	The risk of indoor radiation by radon/thoron is distributed over the population in a relatively fair way. Actually everybody has more or less the same chance of exposure to this risk in such an area.
Noise by road traffic	-	Noise by road traffic is not distributed in a very fair way. It is predominantly the people who live near main roads who are exposed to the risk, while almost everybody profits of these roads.
Antennas mobile phones	-	The risk of EMF by antennas for mobile phones is not distributed fairly. It is mainly the residents that live near the sites for antennas who are exposed (above a possible effect level).





### **Perception of the attributable number of cases**

What do people think about the size of the group of people that experiences a health effect as a consequence of this environment and health risk? The scale runs from 0 (nobody) to +++ (very large group).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	The general public is not familiar with the risk of indoor radiation (Fast & Van Bruggen, 2004, pp. 54-63).
Noise by road traffic	++	Large group, as there is a significant number of people that lives in the vicinity of main roads.
Antennas mobile phones	++	Large group, as there is a significant level of attention by the media, the scientific community and websites. Moreover, the potential number of victims is large.

### **Perception of the negative effects on health and/or safety**

To what extent do people experience a threat to their health and/or safety? When the experienced threat increases the score on the scale also increases. The scale runs from 0 (no perceived threat) to +++ (strongly perceived threat).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	Most people do not pay attention to the risk of exposure to radiation by radon, thoron etc. in the house or at other spots in the built environment (Fast & Van Bruggen, 2004, pp. 54-63).
Noise by road traffic	++	In case of much noise by traffic, the road are perceived as less safe. Moreover, research shows that feelings of unsafety are correlated with increased annoyance by environmental noise (Fast & Van Bruggen, 2004, p. 84).
Antennas mobile phones	++	In the Netherlands there is a significant level of commotion about the potential impact of EMFs on health. This was the reason for establishing an internet based platform on electromagnetic fields. This platform is managed by RIVM and integrates and judges all available knowledge on research findings about EMFs. According to the Dutch <a href="http://www.stopumts.nl">www.stopumts.nl</a> website there are in the Netherlands approximately 50 municipalities that do not allow the siting of antennas as a consequence of commotion in the local population.

### **Is the risk voluntary and/or controllable**

If a risk can be controlled and consequently there is a certain level of voluntary exposure, people often consider a risk less risky. The scale runs from – (not voluntary) to + (voluntary).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	-	People are in general not aware of their expose to indoor radiation.
Noise by road traffic	-	This is not voluntary. Only if one decides to move to a house near a main road could (to a limited extent) we speak of voluntary exposure. In other situations one could control the situation to some extent by deciding to sleep at the back of the house (Fast & Van Bruggen, 2004, p. 84).
Antennas mobile phones	-	Everybody is exposed to the electromagnetic fields from antennas for mobile phones. As a consequence there is involuntary and uncontrollable exposure. It is not allowed however to connect a mobile phone antenna to a building without the explicit permission from its residents (Fast & van Bruggen, 2004, p. 20).







### ***Is there trust towards responsible authorities***

A lack of trust in authorities might amplify the level of risk perception. The level of trust can be scored from – (very bad) to ++ (very good).

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	-	The exposure to indoor radiation is for a large part dependent on developments in the Dutch building sector. The image of this sector is bad due to, amongst others, a few large fraud affairs.
Noise by road traffic	+	There is no good reason to assume that there is no trust in responsible authorities.
Antennas mobile phones	+	There is no good reason to assume that there is no trust in responsible authorities.

#### **- Links with public policy needs**

### ***Usefulness for the broader public***

Is the topic useful for the broader public, and not only for research purposes? This does not necessarily relate to the amount of public concern, but also to e.g. the usefulness from a public health perspective.

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+++	Almost everybody is exposed to this evident and acknowledged environment and health risk.
Noise by road traffic	++	The broader public is served well if noise levels will decrease. However, the number of people that live near main roads is smaller than the number of people exposed to the other two risks.
Antennas mobile phones	+++	Almost everybody is exposed to this potential environment and health risk.

### ***Are there standards or regulations in place***

For this criterion/effect we use a binary scale in which 1 = yes and 0 = no.

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	1	Yes, there are European intervention values. The European intervention advices make a distinction between existing houses and houses that still have to be built. For existing buildings, interventions are advised when a concentration of 400 Bq m <sup>-3</sup> is exceeded. For new houses, an intervention value of 200 Bq m <sup>-3</sup> (Fast & Van Bruggen, 2004, p. 55) is set.
Noise by road traffic	1	Yes, there is a European guideline and there are emission requirements for vehicles and tires. On the Dutch national level, the law on noise nuisance, which determines limits and target values for the level of noise at the fronts of houses, schools and hospitals, is applied. Furthermore, the Dutch law on environmental protection regulates the level of noise of transport by enterprises (Fast & Van Bruggen, 2004, p.85).
Antennas mobile phones	1	Yes, as the safety requirements for mobile phone antennas have been registered in European norms (EN 50385, prEN 50400 en prEN50401), which are based on values chosen by the International Commission on Non Ionizing Radiation Protection (Fast & Van Bruggen, 2004, p. 21).





### **Possibilities to tackle the problem**

Is it possible to take measures in order to limit or to avoid a risk? If there are more possibilities for measures, the score on the scale will be higher. The scale runs from 0 (no possibilities) to +++ (yes, it is very good possible to take measures).

<b>Scores and legitimization per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	++	There are several technical solutions. Moreover, there are several legislative measures feasible.
Noise by road traffic	+++	On the European level it is possible to dictate stronger limits on motor noise emissions and the noise emissions by tires. On the national, regional and local level it is possible to stimulate silent techniques and insulation measures. Moreover, the physical planning can be improved, the use of cars discouraged, and a lower speed limit set, etc. (Fast & Van Bruggen, 2004, p.85).
Antennas mobile phones	+++	European legislation concerning mobile phone antennas obliges manufacturers to take care that their products are safe when these are used in the intended way, but the national or local authorities can prescribe additional requirements, e.g. a minimum distance to dwellings. Moreover, it is possible to use risk communication in combination with a measurement of the actual exposure (Fast & Van Bruggen, 2004 pp. 85).

### **Responsibilities/liabilities**

To what extent is it possible to pin-point the responsibility for intervention measures? The better this is possible, the higher the score on the scale will be. The scores run from 0 (impossible) to +++ (highly possible).

<b>Scores and legitimization per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	++	Regulation is the responsibility of the authorities. Information campaigns can also be used –e.g. about ventilation- to influence radon concentrations. For technical measures the builders and owners are responsible. The actual use of ventilation systems is in the hands of the tenants (Fast & Van Bruggen, 2004, p. 56).
Noise by road traffic	+	In general, the road maintenance authority is responsible (State, province or municipality). It gets more complex if the increase of traffic is the result of actions by other road maintenance authorities. Moreover, the state is responsible for the costs of the sanitation of a large number of dwellings that have been exposed to unacceptable levels of noise by traffic for several years (Fast & Van Bruggen, 2004, p. 86).
Antennas mobile phones	+++	The ministry for economic affairs is responsible for legislation. The responsibility for intervention has been implemented in the food- and drugs act and the law on telecommunication. Moreover, the local health authorities are responsible for risk communication and the registration and the management of complaints (Fast & Van Bruggen, 2004, p. 23).

### **Effectiveness in theory**

Can the health effects be restricted by taking measures in principle (in theory)? The scores can be registered on a scale that runs from – (bad effectiveness), via 0 (reasonable effectiveness) to + (good effectiveness).

<b>Scores and legitimization per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	The measures are not equally effective for all radiation components. Increasing the amount of ventilation will for instance not influence the level of external radiation (Fast & Van Bruggen, 2004, p.56).





Noise by road traffic	0	There is a large variety of measures possible of which a significant number has shown its effectiveness in reducing the level of noise. For most of the measures it is not possible to indicate in advance how much the reduction in the noise level will be. Much is dependent upon the way the measures are implemented. Effectiveness in reducing the level of noise nuisance is more difficult. Much is dependent upon so-called non-acoustic factors. Moreover, the effectiveness is dependent upon the noise level before measures were taken. When there are initially high noise level a reduction is much less effective than the reduction of initially low noise levels (Fast & Van Bruggen, 2004, p. 87).
Antennas mobile phones	0	The manufacturer or the company that sites a mobile phone antenna is responsible for the safety near the site. As a consequence intervention measures may be very effective. Very little information is available about the effectiveness of measures to take away so-called aspecific complaints like worry and 'decreased well being'. A complicating aspect is that there is still discussion about the existence of negative health effects of electromagnetic fields (Fast & Van Bruggen, 2004, p. 24).

### **Effectiveness in practice**

Is it possible to restrict the effects on health in practice. Measures sometimes can prove to be ineffective. Possible causes are: fraud, lack of control, etc. The effectiveness in practice can be scored on scale that ranges from – (bad effectiveness in practice) to + (good effectiveness in practice).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	The technical feasibility of the several measures mentioned in newly built houses is no problem. Only if the requirements for dwellings get significantly higher then today technical problems will become an issue. In that case conflicts with other requirements may appear. Obeying the laws and rules should be established by controlling and providing information in order to prevent citizens or local authorities from undoing the measures taken. Fraud is possible however: whether or not builders respect the building decree should be checked by the municipalities (Fast & Van Bruggen, 2004, p.57).
Noise by road traffic	-	A part of the measures is ineffective: this holds for the noise emission limits for mopeds. For roads within the city, mopeds are the most important source of noise and the most important cause of nuisance. The police have measurement equipment in order to handle this problem, but it is not very high on their priority list. Moreover, noise insulation measures of houses are partly undone through ventilation activities.
Antennas mobile phones	0	The legislation by the Ministry of Economic affairs is very effective. On the other hand: it is not very realistic to limit the number of mobile phone antennas as there are large societal objections against this course of action.

### **Who carries the burden, who receives the profits**

Environment and health risks can be distributed in a fair or an unfair way. This means that we can speak about distributive fairness. An example of an environment and health risk that has been distributed in a fair way is the risk of cancer as a consequence of exposure to sun. This is a result of the fact that everybody is exposed in the same way. An example of environmental risk that is not distributed fairly is air pollution by industry. In this case local residents carry the burden, while a lot of others (consumers, employees, managers) receive the profits. This criterion can be scored from very bad distributive fairness (--) to very good distributive fairness (++)





<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+	The risk of indoor radiation by radon/thoron is distributed over the population in a relatively fair way. Actually everybody has more or less the same chance of exposure to this risk. If they live in a radon area? What about those who don't?
Noise by road traffic	-	Noise by road traffic is not distributed in a very fair way. It is predominantly the people who live near main roads who are exposed to the risk, while almost everybody profits from these roads.
Antennas mobile phones	-	The risk of EMF exposure from antennas for mobile phones is not distributed fairly. It is mainly the residents that live near the sites for antennas who are exposed (above a possible effect level).

- **Topic requires a multidisciplinary approach**

Does the topic under concern require a multi/interdisciplinary approach? Some topics like climate change require a diversity of disciplines in order to study the full scope of the problem. This criterion can be scored on a scale that ranges from 0 (no, one discipline suffices) to +++ (yes, cannot be done without different disciplines).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+	Does need a limited diversity in expertise. In fact it is predominantly a radiation issue.
Noise by road traffic	+++	Requires knowledge about acoustics, epidemiology, (environmental) psychology, physical planning. Noise is a pure psychoacoustic problem.
Antennas mobile phones	++	Requires knowledge about radiation, epidemiology, (environmental) psychology. Multidisciplinarity is a little less than in the case of noise.

- **Benefit of international collaboration**

**Geographical scale of the problem**

Environment and health problems sometimes stretch over a larger geographical area. This holds for instance for air pollution and climate change. For other topics, their influence is limited to a much smaller area. This criterion can be scored on a scale that ranges from 0 (local influence sphere) to +++ (international influence sphere).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	Predominantly a local problem.
Noise by road traffic	0	Predominantly a local problem– but the same problem in all countries ?
Antennas mobile phones	0	Predominantly a local problem – but the same problem in all countries ?

**Could not be solved with domestic resources alone**

Research with large consortia requires a lot of financial resources. International research provides the possibility to pool resources and perform research that otherwise would not be possible. This criterion can be scored on a scale that runs from 0 (no, national resources are sufficient) to +++ (yes, without pooled resources research wouldn't be possible).

<b>Scores and legitimation per topic</b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	Already a lot of knowledge is available. No large exploratory studies needed.





Noise by road traffic	+	Exposure can grow easily. Will be a challenge to mitigate the effects.
Antennas mobile phones	+	There is still a lot of uncertainty about possible health effects and the working mechanism behind complaints/reduced well-being.

### ***Need for access to knowledge abroad***

Leading edge and complementary know how may, in some cases, only be available abroad for specific topics. International research may also give access to skilled individuals that have an interest in pursuing opportunities for research in another country (recruiting or temporary arrangements). This criterion can be scored from 0 (no need for access to knowledge abroad) to +++ (severe need for access to knowledge abroad).

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	+	Leading researchers on this topic live and work in different countries. The combination of their knowledge makes it possible to make progress in this research area.
Noise by road traffic	+	Leading researchers on this topic live and work in different countries. The combination of their knowledge makes it possible to make progress in this research area.
Antennas mobile phones	+	Leading researchers on this topic live and work in different countries. The combination of their knowledge makes it possible to make progress in this research area.

### ***Desire to influence supra-national standards/regimes***

International research might have a reasonable chance to influence WHO/EU regional frameworks for action, for instance. The criterion can be scored on a scale that runs from 0 (no desire) to +++ (strong desire).

<b><i>Scores and legitimation per topic</i></b>		
<b>Topic</b>	<b>Score</b>	<b>Legitimation</b>
Indoor radiation	0	There are no clear indications that researchers have the ambition to influence supra-national standards/regimes.
Noise by road traffic	0	There are no clear indications that researchers have the ambition to influence supra-national standards/regimes.
Antennas mobile phones	0	There are no clear indications that researchers have the ambition to influence supra-national standards/regimes.

## **References**

BEIR VI (1999). Health effects of exposure to radon, Committee on Health Risks of Exposure to radon, Board on Radiation Effects Research, Commission on Life Sciences, National Research Council. National Academy Press, Washington, DC.

Fast, T., & Van Bruggen, M. (2004). Beoordelingskader Gezondheid en Milieu: GSM-basisstations, Legionella, radon, fijn stof en geluid door wegverkeer [Appraisal Framework Health and Environment: GSM base stations, Legionella, radon, small dust particles and noise by road traffic] (No. 609031001/2004). Bilthoven: RIVM.

Gezondheidsraad (2000). Radon: toetsing rapport 'BEIR VI' (2005/05). Den Haag: Gezondheidsraad.





Knol, A. B., & Staatsen, B. A. M. (2005). Trends in the environmental burden of disease in The Netherlands (No. 500029001). Bilthoven: RIVM.

Miedema, H.M.E. & C.G.M. Oudshoorn (2001). Annoyance from transportation noise: relationships with exposure metrics DNL and DENL and their confidence intervals. *Environmental Health Perspectives*, 109, 4, 409-416.

Van Kempen, E.E M.M., & Houthuijs, D.J.M. (2008). Omvang van de effecten op gezondheid en welbevinden in de Nederlandse bevolking door weg- en railverkeer (No. 630180001). Bilthoven: RIVM.



## How to join the ERA-ENVHEALTH project

### Your organisation funds and/or manages E&H research programme

If your organisation is interested in taking part in the ERA-ENVHEALTH project, please contact the leader of the "Extend the network" task for more information on how to join the project as an E&H research funding and/or managing organisation:

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### You are interested in becoming a member of the External Interest Group (EIG)

If you are interested in joining the External interest group to be kept informed of the progress of the project and maybe be called upon to participate in certain meetings and discussions, please contact the leaders of WP5 "Dissemination and Communication":

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### You are part of another ERA-NET focusing on Environment and/or Health

Other ERA-NETs with a focus on environment and health are more than welcome get in contact to exchange ideas and look at possible cooperation. In this case, please contact the coordinator of the project:

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## Partners of the consortium:

Partner name	Acronym	Logo
French Agency for food, environmental and occupational health safety (France)	ANSES	
French Environment and Energy Management Agency (France)	ADEME	
Ministry of Ecology, Energy, Sustainable Development and the Sea (France)	MEEDDM	
Belgian federal Science Policy Office (Belgium)	BelSPO	
Federal Public Service Health, Food Chain Safety and Environment (Belgium)	FPS	
Environmental Protection Agency (Ireland)	EPA	
Superior Institute for Environmental Protection and Research (Italy)	ISPRA	
Swedish Environmental Protection Agency (Sweden)	Swedish EPA	
Ministry for Housing, Spatial Planning and Environment (Netherlands)	VROM	
National Institute for Public Health and the Environment (Netherlands)	RIVM	
Public Health Authority of the Slovak Republic (Slovak Republic)	UVZ	
Environment Agency (England and Wales)	EA	
Natural Environment Research Council (UK)	NERC	
Ministry of Health (Israel)	MOH	
Federal Environment Agency (Germany)	UBA	
National Research Council (Italy)	CNR	