

## SCIENTIFIC ADVICE, RISK AND EVIDENCE: HOW GOVERNMENT HANDLES THEM

Submission by the Royal Society of Chemistry (RSC) to Science and Technology Committee at the House of Commons

*The Royal Society of Chemistry welcomes the opportunity to make the following submission to **Science and Technology Committee**. This submission has been prepared under the aegis of the Environment, Health and Safety Committee (EHSC) of the Royal Society of Chemistry. Members of the EHSC serve the RSC as individual experts and not as representative of their employer.*

### Executive Summary

- The RSC believes that there are underlying problems within the UK (and EU Agencies) concerning the understanding of the conceptual basis of health and environmental risk analysis by scientists involved in regulatory risk assessments and policy advice for, in particular, chemicals, due to lack of adequate academic and training facilities in the UK (and EU).
- The RSC recognises that, unless good scientific (and technical) advice is taken into the policy making process, the process will yield policies that are not technically acceptable or, worse, not technically feasible.
- It is self-evident that a key issue with regard to advisory bodies is the range of expertise available among members and the secretariats. The RSC has always advocated that advisory groups should where possible have sufficient expertise both in membership and secretariat to evaluate the information put before them.
- There is a problem concerning the nature and adequacy of the in house expertise in Government Departments. Even if most advice is to be gathered from outside it is necessary to have sufficient expertise to identify who is technically knowledgeable and to act as 'intelligent customer' for the external advice.
- The RSC has some concerns that hazard based approaches and the precautionary principle are being used in situations where risk based approaches are more appropriate. The appeal of hazard based and the precautionary principle approaches is that they are easier to apply and administer, however such approaches may result in misdirection of effort to mitigate risk because they do not deal with the likelihood that particular hazards may be realised. Comparative risk assessment should aim to optimise the choice of options for a particular situation, taking into account potential risks to health, wildlife and the environment and the benefits to society as a whole.
- The application of the 'precautionary principle' has to be proportional to the risks involved and there is a tendency (as with all regulators) to adopt a 'gatekeeping' approach and a disproportionately 'hard' precautionary approach when it is possible to pass the costs of implementation to others. There is a danger that, by introducing disproportion, innovation is stifled through the disproportionately high barriers to introducing newer and probably less risky materials.
- Confidence in the transparency of the process by which scientific advice is incorporated into policy development would be enhanced by providing a publicly available record detailing how scientific advice was used or not.

***The Royal Society of Chemistry only wishes to respond to those questions which fall within its area of its experience, and in particular on Government use of scientific advice with respect to chemicals.***

1. With that in mind the RSC believes that there are underlying problems within the UK (and EU Agencies) concerning the understanding of the conceptual basis of health and environmental risk analysis by scientists involved in regulatory risk assessments (in industry, the contract research organisations, consultancies and Government) and policy advice for, in particular, chemicals, due to lack of adequate academic, etc. training facilities in the UK. This lack of understanding by those in Government and academia involved in the application of chemicals risk analysis in the regulatory setting renders any policy advice derived from experience of limited value. It also renders a serious discussion of individual points difficult. The apparent trichotomy between the approaches of engineering risk analysts (dealing with, for example, major industrial accident hazards), chemicals health risk analysts (dealing with, for example, health issues for chemicals generally or for specified uses, such as biocides, plant protection products, food additives and contaminants, veterinary medicines, medical devices and medicines and with air, soil and water quality) and chemicals environmental risk analysts (dealing with environmental issues associated with the manufacture, use and disposal of chemicals and products and with air, soil and water quality) must be broken down, both within Government and more generally.

### ***Sources and handling of advice***

- What impact are departmental Chief Scientific Advisers having on the policy making process?
  - What is the role of the Government Chief Scientific Adviser in the policy making process and what impact has he made to date?
  - Are existing advisory bodies being used in a satisfactory manner?
2. The RSC recognises that, unless good scientific (and technical) advice is taken into the policy making process, the process will yield policies that are not technically acceptable or, worse, not technically feasible. In such circumstances the consequences include inappropriate Government positions, unsatisfactory/ unenforceable legislation and potentially conflicting legislative requirements on those affected by legislation. However, the scientific advice may come from the Chief Scientific Advisor or, through him, from scientific staff within the appropriate Department(s) and/or Agency(ies) as well as from Advisory Committees. The latter normally report to Ministers rather than to Chief Scientists and so should represent an independent line of advice to Ministers.
  3. It is self-evident that a key issue with regard to advisory bodies is the range of expertise available among members and the secretariats. The RSC has always advocated that advisory groups should where possible have sufficient expertise to evaluate the information put before them. In cases where knowledge is limited, scientists can still make a valid contribution by providing an informed opinion based on experience as well as highlight where further research is needed, quantify the degree of uncertainty and suggest an appropriate course of action. The RSC supports soliciting input from a wide range of groups and in being open about the process and the people involved.
  4. In most, if not, all advisory committees complete independence, i.e. freedom from bias, of the members cannot be obtained. There is some concern that evidence from some scientific experts may be marginalised because they are not considered as 'independent' by virtue of their affiliation e.g. links to industry. However, it is important to note that

experts working in the field are more likely to be up-to-date with developments than those who are not. In particular, it is in industry that the closest liaison between the different branches of risk analysis takes place. In contrast the views of campaigning organisations that may have a vested interest in a particular outcome are often regarded as more credible and independent as, it is claimed, they are not directly involved in a particular industry. This is self-evidently incorrect as the campaigning organisations usually have a clear vested interest. Such organisations are often able to make unsubstantiated claims that can distort the discussion and make informed, evidence-based policy-making difficult. Academic members of advisory committees too may have vested interests as they have to fight a continuous battle to secure continued funding of their work. So long as biases are openly acknowledged, affiliations, or lack of them, should not be a reason for disbarring from membership of an advisory body.

5. Two roles that the Chief Scientist(s) and scientific staff should undertake is to advise on possible membership of Advisory Committees, and to ensure that the overall biases of Advisory Committees are, as far as possible, balanced, and the biases of individual members of such Committees are understood.
6. The RSC notes that one role that the Government Chief Scientific Adviser has, whether by design or not, is to highlight key scientific issues to the public through the media (e.g. most recently in the “energy debate”). It is difficult to know, however, what weight the Government Chief Scientific Adviser actually has on policy development within Government.
  - Are Government Departments establishing the right balance between maintaining an in-house scientific capability and accessing external advice?
7. There is a problem concerning the nature and adequacy of the in house expertise in Government Departments. Even if most advice is to be gathered from outside it is necessary to have sufficient expertise to identify who is technically knowledgeable and to act as an ‘intelligent customer’ for the external advice. This requires adequate (usually broad, but senior level, and frequently interdepartmental) technical expertise and considerable networking skill (including the ability to network outside the current scientific ‘establishment’) in order to be able to identify the relevant expertise in the appropriate field. Much of the required higher level conceptual expertise in, for example, risk analysis, as applied to issues within their discipline (e.g. for health risks arising from use of chemicals), requires extra-disciplinary knowledge and is outside the traditional interests of academic departments. It is not highly regarded academically (in terms of, for example, interest to the science Research Councils) and is conducted in penny packets (often individuals) who, if employed in academia at all, are employed outside the traditional mainstream. Given the difficulty in locating this expertise accurately, the very highest quality of networking is essential, and usually will require recruitment from outside the Civil Service. Often, this will mean recruitment from industry.
8. However, whilst in the past respected scientists existed in departments like DEFRA, increasingly reliance appears to be being placed on administrative staff to ‘buy in’ the services of consultants. In many cases they lack the competency to frame the question, recruit the appropriate expert or understand the answer when it has been provided. Even where such departmental expertise is available, the scientists who are often located in Government agencies are too far removed from the policy making process.

## ***Relationship between scientific advice and policy development***

- What mechanisms are in place to ensure that policies are based on available evidence?
9. The mechanisms the RSC is aware of are circulation of proposals for comment by interested bodies and presentations at advisory committees.
  10. The US has a different, more long winded, but probably better model of public hearings on all new regulations. The RSC should also comment that the Environment Agency approach, to at least some consultations is to produce a response document which outlines all the comments made and their response, including arguments as to why some comments are being rejected.
    - Are departments engaging effectively in horizon scanning activities and how are these influencing policy?
  11. Given the lack of well-qualified risk analysts in Government, the 'horizon scanning' activities tend to be focused on narrow technical matters and on obvious developments in public perceptions of issues. Experience has shown that once an issue has entered the arena of public debate it is difficult to have an informed discussion on the scientific evidence. In order to have a balanced debate on issues of potential concern, the scientific community should be consulted as soon as such issues are identified so that scientific information can be presented to interested parties for their consideration before such issues become politicised.
  12. The RSC also notes that more Government Departments are engaging in horizon scanning activities. For example, the Home Office introduced a horizon scanning group as part of its police science strategy. The RSC cannot comment, however, on how this group has influenced policy.
    - Is Government managing scientific advice on cross-departmental issues effectively?
  13. There have been attempts at such management (Inter Departmental Liaison Group on Risk Assessment and the Interdepartmental Group on Health Risks from Chemicals). These bodies bring together much expertise, but are only able to proceed at the 'lowest common denominator level'. Further the influence they have on Government Departments depends largely on the quality of the individual members of ILGRA/IGHRC representing the Departments and the influence they have on Departmental attitudes. For specific issues such as consultations on EU actions, *ad hoc* liaisons appear the norm, and these depend on the qualities and attitudes of the individuals involved.

## ***Treatment of risk***

- Is risk being analyzed in a consistent and appropriate manner across Government?
14. It is difficult to analyse risks consistently when expertise is limited and fragmentary. For example, the splitting of regulatory risk assessment for chemicals across several NDPBs discourages the setting up of consistent risk analyses across Government and the development of a higher level conceptual framework within which to operate. The training of risk assessors (regulatory scientists involved with schemes for assessing chemicals, either generally or for specified uses [biocides, plant protection products, veterinary medicines, medical devices, food additives/contaminants, drugs, etc.]) is

likewise piecemeal, is usually biased towards understanding the detail of interpretation of toxicological tests and is limited to that necessary for them to carry out the technical aspects of the work.

15. The RSC has some concerns that hazard based approaches and the precautionary principle are being used in situations where risk based approaches are more appropriate. The appeal of hazard based approaches is that they are easier to apply and administer, however such approaches may result in misdirection of effort to mitigate risk because they do not deal with the likelihood that particular hazards may be realised. It is only through 'risk based' approach that the lowest reasonably practicable level of acceptable risk can be achieved. A 'hazard based' approach that provides a ranked list of hazards is also flawed because in reality most options possess a range of different hazards that will vary in magnitude from one option to another and often in opposite directions. For example, a highly flammable solvent may be less toxic than an alternative solvent of lower flammability. Thus although options can be readily ranked in terms of a specific hazard such as flammability, options cannot be ranked in terms of their overall hazard. The decision to choose one option over another should be on the basis of overall risk. Comparative risk assessment should aim to optimise the choice of options for a particular situation, taking into account potential risks to health, wildlife and the environment and the benefits to society as a whole.
16. The higher level conceptual understanding concerning risk (particularly risk in relation to the health and environmental risks posed by chemicals) within Government is often limited
17. The approach of 'delegating to the lowest level competent to carry out the function' militates against the development of the higher level understandings required for policy advice. This has become evident in the lack of higher level insight shown by the Interdepartmental Group on Health Risks from Chemicals. They have concentrated on the detail of interpreting toxicity studies rather than looking at how toxic risks are to be integrated with other areas of risk analysis, such as engineering risk analysis.
18. Hazard based approaches that seek to eliminate a particular substance by substitution and thereby the risk posed by that substance, may run counter to sustainability. This is because substitutes that may have a lower hazard profile may also have to be used in greater quantities or may consume more energy in order to provide the same level of efficacy.
  - Has the precautionary principle been adequately defined and is it being applied consistently and appropriately across Government?
19. The definition of the precautionary principle from the Rio Conference has general support. There are variations in the application of the 'precautionary principle' according to Departmental attitudes. Its application has to be proportional to the risks involved and there is a tendency (as with all regulators) to adopt a 'gatekeeping' approach and a disproportionately 'hard' precautionary approach when it is possible to pass the costs of implementation to others. There is a danger that, by introducing disproportion, innovation is stifled through the disproportionately high costs of introducing newer and probably less risky materials, compared with the costs of continuing those already on the market. If innovation is not to be stifled, then some form of benefit has to be introduced that outweighs the extra costs of meeting the regulatory requirements associated with the development of better (safer, more environmentally friendly, more sustainable) products.

20. There is, however, a wider problem as there is considerable uncertainty about the whole concept of the precautionary principle. The key issue that needs to be recognised is that the principle does not mean ‘better safe than sorry’ since the application of the principle can often have directly adverse effects – banning DDT vs. deaths from malaria, banning brominated flame retardants vs. deaths from fire.

- How does the media treatment of risk issues impact on the Government approach?

21. It can lead to immediate and often inappropriate responses which are at the time seen by ministers as politically expedient. Media, especially some representatives of the print media, often concentrate on “hazards” in their approach rather than on the risk that that hazard will actually be encountered. Much more measured responses would generally be beneficial.

### ***Transparency, communication and public engagement***

- Is there sufficient transparency in the process by which scientific advice is incorporated into policy development?

22. Confidence in the transparency of the process by which scientific advice is incorporated into policy development would be enhanced by providing a publicly available record detailing how scientific advice was used or not.

- Is publicly-funded research informing policy development being published?
- Is scientific advice being communicated effectively to the public?

23. Generally the public is unaware concerning scientific advice and for the most part lacks the knowledge to interpret it. However, that advice must be in the public domain so that, if things go wrong, there is suitable evidence to see that Government had functioned correctly.

### ***Evaluation and follow-up***

24. Systematic evaluation of the implementation of scientific advice is critical in order to improve the way scientific information is used in policy making.

- Are peer review and other quality assurance mechanisms working well?

25. Quality assurance, at least as understood in Good Laboratory Practice terms, tends to be missing from Government and Government Agency activities.

26. Peer review depends on the quality of the reviewer/review panel and of the material supplied to it. In many cases it is the Advisory Committees (and usually only one or two individuals within the Committees or specialist experts drawn into the Advisory Committee network for the specific issue) that perform this task. If the choice of Committee members is by the same group as that producing the advice there is a possibility of incestuous relationships.

27. Peer review itself does not provide any mechanism to ensure that research output is correct, only that the methodology as reported is consistent with the data output. Peer review is also a *pro bono* voluntary activity and is a system that scientists find beneficial for each other. The system is not designed to deal with QA of policy issues: two papers,

both of which have been adequately peer reviewed, can come to diametrically opposite conclusions.

- What steps are taken to re-evaluate the evidence base after the implementation of policy?

28. The RSC is not aware of much if any *post hoc* examination of decisions taken. This is understandable since if such an analysis indicated that the original decision was incorrect this would be politically embarrassing. Possibly the only way to do this is to leave, for example, a 10 year gap before revisiting the decision.

*The RSC's Royal Charter obliges it to serve the public interest by acting in an independent advisory capacity and we are happy for this submission to be put into the public domain.*

We hope the above comments are of assistance. Please do not hesitate to contact us should you wish us to expand on any of these points.  
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*Notes: The Royal Society of Chemistry is the UK Professional Body for chemical scientists and an international Learned Society for the chemical sciences with 43,000 members world-wide. It is a major international publisher of chemical information, supports the teaching of the chemical sciences at all levels and is a leader in bringing science to the public.*