Science, Evidence and Values in Environment Dispute Resolution*

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Tony Hearn QC: A Tribute

This is the third occasion on which I have delivered the keynote address to the RMLA conference in Christchurch, exactly ten years on from my virgin experience, but it is the first time that my appearance has not been orchestrated by Tony Hearn QC. Instead, it has been prompted by the memory of Tony Hearn, who died in Christchurch on 9 June 2002. I am honoured and quite daunted by being invited to give the first Tony Hearn Memorial Lecture. What a splendid way to keep alive our memories of him; and, more importantly, to keep alive the rigour of scholarship in resource management that he founded and pursued.

Though I had long been an exile from NZ, I knew Tony by reputation. His 1987 report to the Government on the town planning system of New Zealand was something of a tour de force, as rigorous as it was opinionated. I have with me a selection of faded faxes from him in 1994 that conveyed an invitation to speak at the conference and provided me with detailed briefings on the difficult issues that were being grappled with in the new resource management law. These were scholarly and beautifully crafted. But nothing had quite prepared me for the warmth and humour of the man I met in Christchurch that October, and on subsequent visits. I recall vividly his eloquence at the plenary sessions of this conference, now itself a memorial to Tony; and in particular his prowess at after-dinner oratory. The secret about Tony was that his wisdom was founded in scholarship, driven by a natural intellectual curiosity. It seems remarkable that it is now over three years since he died, yet his spirit is present today. How he would have loved to have been here. I am grateful to my sponsors, Lane Neave, for making it possible for me to pay this tribute to him.

Introduction

In this paper I want to explore a theme which has interested me for many years; an interest which has turned into something of an obsession for the past five years for reasons that I shall turn to in a moment. Every practitioner in resource management knows the dilemma. Scientific evidence is brought to demonstrate that a proposed scheme for development carries no risk to human health or the environment. A common contemporary example is electromagnetic radiation, from high voltage overhead lines, or from microwave transmitting masts. But the people who live in the immediate vicinity of the scheme are unpersuaded by the science. They have a different level of risk appreciation from the expert witness. Is the decision-maker compelled to ignore their concern and to proceed on the basis of the scientific evidence?

A science-based risk assessment may be rigorously conducted, and may identify, measure and manage all known risks, yet still leave uncertainties. It will tend to ignore pure correlation of emission and harm in the absence of evidence, epidemiological or otherwise, of causality. The English courts have approached the issue in the context of planning consents, where the decision-maker enjoys a particularly wide margin of discretion, by holding that people's fear of harm, whether scientifically justified or not, may lawfully be taken into account in withholding a consent. There is good reason for this ruling. Scientific certainty is not a constant. It took years for the causality between tobacco smoking and lung cancer to become established and accepted; likewise for the causal links involved in the emergence of BSE. Science provides a bounded set of knowledge; but it is not exhaustive of human values and preferences. A liberal economic approach to regulation tends to dismiss the latter. It justifies regulators in preventing a development from occurring, or a product being brought to market, only if there is demonstrable risk of harm to human health or some other legitimately protectable interest, such as the environment.

There is increasingly frequently in modern regulation a stand-off between these two interests. It is not always as stark as I have presented it above. Science is not a homogeneous body of knowledge that always leads to the same conclusion, least of all in relation to risk. I was taken by something that Morgan Williams wrote recently[1] when he said of the New Zealand GM experience that one group of submitters to the Royal Commission based their scientific arguments on the precautionary principle, while other groups presented

* This paper was delivered as the Inaugural Tony Hearn Memorial Lecture, a keynote address to the 2005 RMLA Annual Conference held at Christchurch New Zealand

1 Parliamentary Commissioner for the Environment, *Missing Links Connecting science with environmental policy* (September 2004) preface

arguments supported by science against undue precaution. In simplistic terms, he says, the main difference was of time frames, the breadth of societal knowledge they were drawing from and their beliefs about how risks and benefits would be shared across society. But this tension is not to be found purely between groups competing before national regulatory fora; exactly the same phenomenon is discernible in the WTO and the EU, where science and protectionism become unhappy bedfellows.

The GM experience both in New Zealand and in the UK indeed prompts a review of our criteria, processes and institutions for handling controversies around risk, particularly in relation to new scientific and technological innovations.

For the past five years I struggled with these issues as chairman of the UK's Agriculture and Environment Biotechnology Commission ("AEBC"). My thoughts are prompted not only by our experiences on the AEBC in the eye of the European storm over GM crops, which I shall develop, but also by some recently-published reflections by others on those experiences. They include Professor Sheila Jasanoff of Harvard University, whose book published last month, *Designs on Nature* [2], explores the distinct cultural differences and institutional approaches between the UK, Germany and the US in their handling of these disputes. She might fruitfully have added an account of the New Zealand experience, which set up a different type of Commission – a Royal Commission – to conduct a different style of interaction with scientists, industry and the public. Others have in parallel been examining the conclusions to be drawn from the GM experience for the public reception of other new technologies, notably nanotechnology.

The days when scientific discovery and new technology could be assured of an enthusiastic public reception are now gone. True, we are quick as individuals to adopt and adapt to new technology that has immediate personal benefit, such as mobile phones, air travel, motor cars, computers and i-pods. But new technologies that fail to bring such individualised benefits, or are more collective in scale, have recently encountered unexpected hurdles in winning public approval. The relative ease with which societies 40 years ago accepted the case for developing nuclear energy options is foreign to us now. Indeed, the nuclear experience has tainted our view of subsequent technologies as diverse as the genetic modification of plants and animals ("GM"), nanotechnology, and the imminent next phase of nuclear technology as energy-hungry nations explore carbon-free futures. The claim that technology is by itself neutral, and that it is society that determines whether it is put to good or to evil, is viewed with increasing scepticism when social institutions prove inadequate to that task.

This scepticism with which (mainly) western societies have come to engage with novel technology creates controversies which governments seem ill-equipped to handle. They can have sharp electoral consequences, as the New Zealand experience with GM has demonstrated, which makes it impossible for politicians to press ahead without listening to public opinion. But how can science and public opinion be reconciled, especially in a regulatory environment in which risk assessment and management has come to be characterised as a process of scientific reductionism, often tightly bounded within a framework of acceptable or manageable risk of harm to human health or the environment. It is no surprise that these differences are so readily portrayed as being between something called "science" on the one hand, with all the purity, rationality and objectivity that is the scientific ideal; and public opinion on the other hand, which must by definition if it conflicts with science be ill-informed and stupid.

Leading scientists and policy-makers have for too long been blind to these differences. The so-called deficit model has prevailed: the public need to have a better scientific education. Scientists and industrialists have complained of an "anti-science" climate that is driving out investment in biotechnology in Europe and harming global competitiveness. Yet it is clear that a lack of scientific education has not at all inhibited the take-up of a wide range of popular technologies; nor is it seriously conceivable that a good scientific education would stimulate demand for the consumption of GM products. Human beings are more complex in their attitudes, and more subtle in the way they balance risk and benefit, than such a simplistic and patronising model could ever capture.

Indeed, to characterise these debates as being primarily about science or technology at all is to start at the wrong point: "science" establishes facts in our understanding of the natural world around us, but its practitioners are sometimes tempted to address questions which have broader social resonance as if they were exclusively in the scientific domain. The deficit is not in public understanding of science as much as it is in scientific understanding of the public. Neither scientific inquiry and discovery, nor technological development, is undertaken in a social vacuum.

2 Jasanoff, Sheila *Designs on Nature - Science and Democracy in Europe and the United States* (2005)

The AEBC

The UK Government took a brave step in 2000 in setting up the AEBC. They had been persuaded that a fresh approach was needed to an issue that had quite suddenly flared up into one of seemingly intractable controversy, the proposed introduction of commercial cultivation of GM crops in the UK. Unlike the US experience, but in parallel with the New Zealand experience of the past five years, the European controversy regarding GM crops has thrown up fundamental questions about politics and democracy, about science and personal values, and about accountability and trust. The UK Government seemed to be wanting to do something different from what Commissions are usually set up to do, which is to bury uncomfortable issues until the public furore has subsided.

There was no doubt an element of this thinking – there were clear splits over GM technology within the Government, notably between the Ministers actually responsible for developing policy, and also between the Westminster government and the newly emergent semi-autonomous governments in Scotland and Wales. So there was political frailty, and nervousness about policy development. There was also genuine bewilderment. The GM controversy had caught the responsible ministers of the new Labour Government, which assumed office in May 1997, entirely by surprise. Food products manufactured from GM produce had started to appear on supermarket shelves, such as the Flavr Savr tomato paste. But the PR ineptitude of the leading US biotechnology companies as they fought for a foothold in the European market, coupled to the political fall-out over the Government's mismanagement of the BSE crisis, created a climate of opposition, fomented by the environmental NGOs. It compelled the supermarkets to clear their shelves of GM products, and led to the Government agreeing with the industry a moratorium on the commercial planting of GM crops pending further farm-scale trials to assess the impact on farmland wildlife and biodiversity of the pesticide regimes their cultivation involved.

The UK was not alone in this backlash. The public mood was reflected across Europe. Indeed, it led European environment ministers to establish their own moratorium, almost certainly illegal, on the approval of any further varieties of GM crops for cultivation in Europe. None at all were approved between 1997 and 2004.

But the establishment of the new AEBC seemed to signal more than a parking of the problem. It proposed a wholly new approach towards understanding and dealing with public reception of controversial new technologies. The idea was the outcome of a cross-Whitehall review of the Government's approach to the new biotechnologies[3]. It was not a regulatory body. The function of reviewing applications for GMO releases to the environment already rested with an advisory scientific committee known as ACRE [4]. Yet another scientific body had been set up to oversee the farm-scale trials of GM crops. The role of the AEBC was to be strategic: to furnish the government with advice on the strategic implications of agricultural biotechnology for the environment. This was a broad-ranging remit. Where ACRE conducted its deliberations in private session, the AEBC had an outward-looking role. Indeed, Ministers were quickly to be heard pronouncing that this remarkable new Commission was to be "the voice of the people in Whitehall".

Yet this raised the very contradiction we have touched on above. The release of GMOs to the environment is regulated in the UK under European law, at that time Council Directive 90/220, subsequently revoked and replaced by 2001/18. The new Directive broadened the range of environmental impacts that the risk-assessment must address, but it did not introduce a power to dispense with the risk assessment altogether on the grounds of adverse public opinion. Indeed, public opinion still found no place in the Directive at all, though it came with a somewhat vague reference to a possible ethical committee being established. The AEBC was conscious of this dilemma, but was clear that if necessary for strategic purposes it should not shy away from recommending that the Government pursues changes in European law. In the event, the law was changed to allow Member States to give effect to co-existence schemes[5], to which the directives had previously made no reference.

The AEBC's eventual constitution was surprising: Ministers eventually made no fewer than 20 appointments. Many of its members had agricultural backgrounds, from the seeds industry, from organic

3 The review led to the creation of three new bodies the Food Standards Agency, which took over food regulation from the Ministry of Agriculture Fisheries and Food, the Human Genetics Commission, and the AEBC - they were very different bodies

4 The Advisory Committee on Releases to the Environment, established under the Environmental Protection Act 1990, in pursuance of European Directive 90/220/EC

5 To allow the cultivation of GM crops compatibly with sustaining non-GM agriculture see further below

agriculture, from non-organic agriculture, from agricultural policy analysis, including representation from Scotland and Northern Ireland; there were several scientists, including specialists in plant science, ecology and genetic biology; members who worked in or closely with the agriculture biotechnology industry; leading members of NGOs, including Greenpeace, GeneWatch and the Soil Association, representatives of consumer organisations; two bioethicists (perhaps something of an oversupply), a well-known TV presenter and two lawyers (an undersupply, obviously). There was inevitably some overlap between these groupings.

It was not easy to discern a common purpose in the appointments. There was a remarkable level of seniority. This meant that the Commission contained many of the most prominent actors in the debate about the future of GM crops in the UK. This was critical, not just for the cynical reason of tying them to a common agenda of value to the Government, but in order to assure the various communities of interest to which they belonged that the AEBC collectively had the clout to be an effective organisation.

But it also meant that seated around the table was a group of people who started from a position of deep scepticism of each other's positions; indeed, that lacked even a common language in which to express their different views. They might use the same words, but in the expression of different underlying values. In the beginning it was as if there were no fruitful points of intersection between natural and social sciences, but as time went on and trust started to develop, there were useful, sometimes truly eloquent, debates about the nature of scientific inquiry, the limits to reductionism, the bounded nature of inductive inquiry, the conjoined concepts of evidence and proof, of risk and its management, and the issue of conflict of interest in commercial funding of science and new technology.

The tensions were too great at the outset for the AEBC to contemplate meeting in public. Instead, it held public meetings at each venue for the purposes of consultation and formal evidence-taking, but like a Parliamentary Select Committee then reconvened in private for the bloodletting deliberative sessions. With maturity, however, this approach looked wrong, and it was reversed. After 15 months, the AEBC conducted all of its business in public; all of its papers were posted on the web, including reports in the course of preparation. It was a new chapter in openness in British science policy. It helped avoid sensationalist headlines, though not entirely: the press demonstrated their hallowed ability to invent and misrepresent material whether it was on a website or not.

Independence

It was a absolute precondition of the co-operation of its members that the AEBC would be independent of Government. This was not easy to maintain, and it had a cost. The easy interaction that Government officials traditionally enjoyed with scientific advisory committees was largely absent from the AEBC as its members insisted upon maintaining an appropriate distance. There was inevitably suspicion on both sides. Officials feared sharing too much intelligence with a commission that included leading NGO members; commission members mistrusted Ministers' motives, a mistrust that was fuelled in 2004 when secret Cabinet sub-committee minutes were leaked to the press that indicated that some senior Ministers had even then failed to progress beyond the deficit model. Ministers wanted a commission that would be strong-minded and independent; but they certainly did not want it to be outside their sway.

Phase 1: The Farm-Scale Evaluations

The differences of world view within the AEBC also made for obvious tensions in debate. In the sessions that led to our first report, *Crops on Trial* in 2002, some of the debates were so intense that tears were not unknown. This report tested the Commission to the full; indeed, looking back on it is remarkable that we achieved any, let alone unanimous, agreement around the final text. The farm-scale trials had proved a lightning rod for public opinion: they introduced a spatial dimension to GM crops. People learned that they were being grown in their local areas. Indeed, map co-ordinates of all the locations were published by the Government on a website. The trial sites attracted objectors, culminating in a team of Greenpeace protestors led by Lord Melchett, who had once been a Minister in a previous Labour Government, conducted a well-televised operation in tearing up GM plants from a trials-field in Norfolk. In the subsequent trial for criminal damage, they were first discharged when the jury failed to agree; and later acquitted by a second jury, who accepted their defence that acted with lawful justification.

The AEBC resisted calls for the trials to be abandoned. They were important ecological experiments, and the results should be collated and published. But the report also expressed concern that the trials had come to assume a political importance beyond their reasonable carrying capacity. They were strictly limited in their remit. They were not ecological trials of GM crops as such, but of the pesticide regimes associated with them. The crops had been genetically modified to be resistant to glyphosate, the active ingredient in Monsanto's Round-up pesticide, so the whole field could be sprayed with this broad-spectrum pesticide, with a view to greater convenience in crop management and a lower chemical input overall. For the trials, fields were sown half with GM and half with non-GM crops (oil seed rape, maize, and two varieties of beet, fodder and sugar), and pesticides were applied accordingly.

Despite the narrow remit of the trials an assumption was gaining ground that they were the last piece in the regulatory jigsaw, and that should they fail to demonstrate adverse effects from GM crops, the way would be clear for a decision on commercialisation. The AEBC challenged that view. It pointed up the need to resolve other critical issues, such as rules for co-existence of GM crops with non-GM crops and, in particular, with organic agriculture which operated under an EU regime prohibiting the use of GMOs in production. The AEBC also pointed up the need to address the issue of liability, both economic (as where the interests of another farmer were harmed as a result of GM contamination or cross-pollination), and environmental. We were to return to both of these issues. But we also urged on the Government that, given public concerns about the subject, it should not proceed to authorise commercialisation without first engaging in a broader public debate.

This recommendation was accepted, and the challenge was thrown back to the AEBC as to what a public debate might involve. It is a phrase used extensively in the UK, but more in rhetoric than in reality. It commonly means no more than a couple of newspaper columns and some letters to the editor, perhaps a Select Committee hearing in the House of Commons, perhaps a public rally or two. But there was curiously no experience of setting up a public debate as a true process of public engagement. The AEBC designed a template and submitted it to the Government. It was approved. We had determined that the Commission itself should not be the body to conduct the debate. It was a high-risk exercise and we wished to insulate the AEBC from it. The Government therefore invited me personally to lead the exercise, and to set up a steering board to assist me. That is when the trouble started.

Phase 2: The Public Debate

Although the Government had agreed to a public debate, it would be wrong to assume that it was at all enthusiastic about it, especially as the realities dawned. There was serious nervousness that it might get out of hand, that it would be hi-jacked by an anti-GM movement, that it would bind the Government's hands politically when it came to take regulatory and policy decisions; that it might even cause serious political damage. And so the lack of enthusiasm came to be felt in a series of potentially disastrous decisions.

The first was the question of timing. The Government wanted an early start and finish. Their proposals seriously underestimated the time that was needed for planning. But Ministers in the devolved administrations of Scotland and Wales feared that to conduct the debate in the run-up to their regional elections could bring GM into mainstream politics in the way that had happened in New Zealand, and this was not at all desired. A postponement was secured.

Then there was the question of funding. The budget originally proposed was hopelessly inadequate. Precious time was wasted whilst an uplift was negotiated, leading eventually to its doubling. It still fell far short of what was necessary to have conducted an innovative exercise to greatest effect, but we determined to press ahead in any event in the belief that even a sub-optimal exercise would be better than none at all.

This was not to be a simple test of public opinion. That could be done without a debate. There was no shortage of opinion poll data on public acceptability of GM crops and GM food. The purpose of the debate was to engage people in a more reflective process of argument and thought. There were therefore four main components:

- Debate briefing material, made available in hard copy, on the web and by CD Rom: the exercise almost faltered for want of agreement as to what legitimately could go into these materials and what could

not. Scientists wished to exclude all non-scientific material, or at least to put a health warning against expressions of opinion that were unsupported by scientific evidence. NGOs threatened to withdraw their co-operation in the exercise. Common ground was eventually hammered out but it resulted in stimulus material that fell far short of that description.

- Public meetings where issue could be taken between competing viewpoints: six of these were organised by the Steering Board and were high profile regional affairs, attracting extensive press coverage. That was important: the budget had no allowance for spending on publicity. Fortunately, newspaper coverage was greatly enhanced when Tony Blair sacked the Environment Minister, Michael Meacher MP, shortly after the debate got underway, and Meacher immediately transformed himself into a powerful anti-GM campaigner. The theory was that these meetings would stimulate an uprising of local meetings around the country, organised by voluntary groups. We estimated that there might be as many as 200. In the event, the number of such meetings, each involving more than 30 people, rose to over 670 in the course of the six weeks of the debate, during an exceptionally hot summer period.

- A returnable form on which opinion could be recorded around a series of questions based on the materials and debate: we anticipated a return of up to 10,000; the reality was well over 35,000.

- A separate exercise, that came to be known as the "narrow but deep" component, involving a focus-group type methodology but specifically designed for this purpose. This was perhaps the most innovative component. Where the other activities were open to all-comers and inevitably therefore self-selecting – there was a constant risk that such open meetings could be hi-jacked by interest groups – participants in the narrow but deep exercise were selected using agreed profiling and sifting criteria. They did not necessarily have any prior knowledge of GM issues. This was generated in them by low key facilitation, and by providing materials for reading before the participants returned for a second session. The facilitators assessed how people's views developed initially, and how they changed upon exposure to fuller information.

But alongside this exercise were two other exercises which were to prove of considerable influence. They had been proposed by the Government without prior consultation with the Steering Board, and initially as wholly separate operations. The first was to be a study by the Prime Minister's Strategy Unit of the economics of GM crops; the second to be a study led by the Chief Science Adviser of the state of knowledge of GM science.

To us the greatest risk was that the three strands would run separately and disparately, and we could see powerful advantages in drawing them together into a single operation. The Strategy Unit agreed that their exercise should build upon the public's own definition of the questions, that members of the AEBC should be involved in their scenario planning exercises and that they would report regularly to the Public Debate Steering Board. The Chief Science Adviser agreed that his group should be comprised not only of scientists but also of questioning non-scientists, including the Deputy Chair of the AEBC and one other member. He also agreed that the group should meet in public.

The upshot was a wide-ranging investigation of the key issues that needed to be studied prior to any decision to commercialise GM crops in the UK. The Strategy Group's conclusions made bleak reading for the industry. They detected such a weakness in consumer demand as to suggest that the early pesticide-resistant GM crops were unlikely to succeed in European markets. The Science Review identified several areas where further research needed to be undertaken on the potential ecological impacts of GM crops.

The outcomes of the broader debate overall are informative. They demonstrate what the Government already thought that it knew, which was that GM was not popular. Although the degree of unpopularity disclosed by the open parts of the debate was greater than that commonly disclosed in opinion polls, and this was commonly ascribed to the open character of the process (though steps were taken to scrutinize returns to guard against multiple submission from a single source). What was less expected was the extent to which the view was mapped by the narrow but deep group.

A summary of the overall levels of activity is as follows:

- 20,000 people attended 675 meetings across Britain.

- The public sent in 1200 letters and e-mails.

- The website received 2.9 million hits in just six weeks.
- 70,000 feeback forms were downloaded; 36,557 were returned.

Of the respondents:

- 93% believed GM technology was driven by profit rather than public interest.
- 85% thought GM crops would benefit producers, rather than ordinary people.
- 84% believed they would cause "unacceptable interference" with nature.
- 54% never want to see GM crops grown in Britain.
- 86% were unhappy with the idea of eating GM food.
- 93% said too little was known about health effects.
- 2% were happy with GM foods in all circumstances.

The *New Scientist* summarised the key messages from our report as follows:

- British people are generally uneasy about GM.
- Finding out more about the issues simply deepened people's concern.
- Few people support early commercialization, with more than half attending the debates saying they never wanted GM crops grown in the UK.
- Widespread mistrust of government and multinational companies.
- People want to know more, and crave a "corpus of agreed 'facts' accepted by all organisations and interests".
- Developing countries have special interests, but fairer trade rules would do more to eliminate hunger than GM crops.

What came through remarkably clearly from all strands of the debate was that public opinion on GM could not be simply categorised into pro and anti. People's views were more conditional. They saw that provided certain tests were met, the technology might bring benefits. Their concerns were not so much with the nature of the science, not even with the notion that there might be something unnatural in modification; as with issues of owernship, control and exploitation of the technology. The desire for more "facts", accepted by all orbgansiations and interests, was another way of expressing a wish for trust. People wished to able to redress the deficit of trust by recourse to independent expertise and technical consensus.

The shortfalls of the process

As the House of Commons Select Committee concluded in their post-mortem on the process[6]:

> *30. As we have discussed above, the problems were a lack of time and a shortage of money, which Professor Grant described as placing "constraints" on organising the debate. He told us that "in order to attract a much wider range of people in the discussion you need a much bigger publicity budget and also I think a much more developed methodology for engagement with those groups; more networking, more time, more opportunity". The Minister, however, questioned whether additional money spent on "publicity material would generate more involvement and participation".*
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> *31. We agree with Professor Grant.* ***Whether or not the 'public' in general would have become involved in the debate, the inevitable consequence of insufficient resources being available to publicise and promote it was that it did not engage the wider population. It would have been helpful if there had been an opportunity to employ a range of techniques to encourage public participation. Moreover, time was an important factor: with more time a greater amount of work could have been done to***

6 House of Commons Select Committee on Environment, Food and Rural Affairs, *Conduct of the GM Public Debate* Eighteenth Report of the Session 2002-03 HC 1220

reach out more widely. It is profoundly regrettable that the open part of the process, far from being a 'public debate', instead became a dialogue mainly restricted to people of a particular social and academic background. The greatest failure of the debate is that it did not engage with a wider array of people.

32. *We have been given tantalising hints of what might have been achieved with more time and more money. Even with limited resources for publicity the debate was covered both in the news media and in episodes of the Archers and the Moral Maze. Professor Grant told us that given more time "we would have developed the relationship with the media that we needed to". We would have liked to have seen and heard many more informative or argumentative programmes on television and on radio. A primetime television debate, such as has been held in relation to the monarchy and hunting, would have been welcome.* ***To engage with the wider public the debate needed to go into their living rooms, rather than be conducted in the village hall. With sufficient time and money to publicise and promote the debate, we have little doubt that it would have been possible to do so.***

The issue of trust

An argument commonly heard in the course of the debate was that the controversy reflected a deficit of public trust, in the Government and in science, and particularly, it seems, in Government science. Polls of public opinion showed higher levels of trust for scientists working for NGOs than for those employed by the Government (an outcome which most puzzled the NGOs and their scientists). Although prominent academic as well as industrial scientists maintained that there was no evidence of health hazards associated with GM food, a significant proportion of the public claimed to be unpersuaded. To this we may respond, with Onora O'Neill[7], that there is frequently a difference between what people report about their level of trust and what they actually do, for example in continuing to rely upon advice from doctors when levels of trust in medical practitioners have fallen significantly over the past decade. But the complementary argument is that with the early GM crops, and the products that might become available from them, there was no need for such a difference to appear. The public had no need to be a disgruntled untrusting consumer; it had the power simply not to consume. None of the early generation of GM crops offered consumers any advantages in terms of health, nutrition, flavour or cost benefits to health or reduction in cost. At the simplest level, therefore, if indeed the technology brought new risks, as the NGOs and press maintained, no consumer was obliged to accept them. Individuals were free to reject GM food, a lesson that the supermarkets quickly learned and swept them from their shelves.

There is no doubt that the genetic modification of plants is a technology with a future. In a study published earlier this year the AEBC investigated the likely public reception of the technology as applied to non-food crops, to see whether the food association of the early crops was a key factor in public rejection. We looked in particular at modification intended to deliver pharmaceutical benefits, and also at crops that could be developed for use as biofuel. There was clearly a greater readiness amongst discussants – using a methodology not dissimilar to that of the "narrow but deep" sessions in the GM Nation? debate – to accept such uses, though the issues again boiled down to a question of trust in the qualities and independence of those charged to take the decisions, coupled to a concern that such crops should not be seen by the industry as a means of buying public acceptance more generally.

The NZ experience

I claim no detailed knowledge of the NZ Government's handling of the GM controversy, but I did observe it from a safe distance. Its central point of process was the Royal Commission, chaired by a former Chief Justice, with a membership comprising a bishop, a scientist and a medical practitioner. From the perspective of the very open and unstructured process upon which we had embarked in the UK, I often envied the NZ procedure. It seemed to have the capacity to absorb and contain the controversies, to resolve the disputes robustly through force of law and evidence, and to map out a clear path for the Government which had a strong need for such advice. It managed to combine formal evidence-taking with less formal public meetings. It demonstrated rather well the flexibility of the Royal Commission model. Within its

7 O'Neill, Onora *A Question of Trust - The BBC Reith Lectures 2002* (2002)

terms of reference I believe that it was a successful operation. It marginalised the more extreme opinions around the technology, it was sensitive to the flow of international opinion in proposing a cautious way forward, and it offered reassurance that the technology, properly managed, could provide benefits in certain areas.

Phase 3: Co-Existence and Liability Issues

One of the perennial issues in the life of the AEBC was the incompatibility of GM farming with organic agriculture. The EU Regulation defining organic agriculture forbids the use of GMOs in the production of organic products, and legal differences still exist as to whether the ban is absolute, such that any produce found to contains GMOs may not be sold as organic; or whether it extends only to deliberate use. The EU Regulation makes provision for the definition of thresholds up to which GM content might be tolerated but it has proved impossible to secure agreement around what the threshold should be. Another threshold already exists under the EU regime for labelling of products as having been made using GM ingredients, and this is set at 0.9%. Were this to be applied also to organic produce, it might well be economically achievable for most crops. However, representatives of organic farming have continued to resist such an outcome, arguing for a zero threshold, or at least its nearest measurable equivalent of 0.1%. The AEBC was unanimous on the desirability of the 0.9% threshold, but was unable to reach a unanimous recommendation beyond that point, so concentrated in its report on an analysis of the scientific and practical implications of the alternative choices.

The AEBC was clear that commercialisation of GM crops in the UK ought not to be permitted unless and until rules had been devised to allow GM and non-GM crops to co-exist, at whatever threshold might be agreed. The EU regime has been amended to allow Member States to impose restrictions on GM cultivation in the interests of securing co-existence, and has left open a broad measure of appreciation for such regimes. Much in practice can be achieved by setting separation distances between different types of crop in order to minimise the risk of cross-pollination from outcrossing crops, but other measures are also necessary in terms of cleaning of equipment and transportation, many of them familiar already in the specific context of seed production where they are used to secure high levels of genetic purity.

In addition to such physical and management measures, the AEBC's report proposed a model of economic liability, which would compel a GM farmer to compensate a non-GM farmer for contamination by cross-pollination or otherwise, so as to provide back-up and reassurance. It was to prove a controversial area. Ideally it would be covered by insurance, alongside other farming risks, but insurers have taken to excluding GM risks from their cover. There was also an argument whether the insurance should be first party, like crop protection cover, or third party: who should bear the costs?

In the absence of a mature insurance market, the only way through the maze was to propose the establishment of a special fund against which claims, generally thought to be relatively low in value (for example, for the loss of the organic premium), would be made. It could be funded by the Government, or by a special levy on the technology holders or the seeds industry, or on both. Neither the Government nor the industry proved opposed to the recommendation, but neither could agree to contribute to the cost.

Environmental liability

This is still a difficult and controversial area, because it compels some imagination of the different types of ecological damage that might be generated by commercial cultivation of GM crops. Adverse environmental effects might well, as with pesticides, be at large, and be better regulated at source than addressed post hoc through liability. It proved a difficult area in NZ as well[8]. For the EU, the specific inclusion of GMO release in the new environmental liability directive offers a limited way forward, and the AEBC's advice to the Government was to employ this as a platform for a future regime rather than to develop a separate approach.

8 Chen Palmer and Partners; Simon Terry Associates *Who Bears the Risk? Genetic Modification and Engineering* (2001)

The Future

These issues are not going to disappear. Indeed, all recent trends suggest that as societies become wealthier, the level of public concern about risk tends to advance rather than recede. The Royal Commission approach is certainly commendable. It is capable of providing clear answers to clear questions, drawn from evidence that has been submitted to cross-examination. But this quasi-judicial model has its own risks. It is only as strong as the independent legitimacy that it confers upon the answers it provides. Even Royal Commissions are not immune to public mistrust.

A common reaction in the UK to the GM experience has been that it happened too late. People's attitudes had already hardened, to the point where open and intelligent debate was hindered. Is it possible to anticipate such controversies at an earlier stage and to engage in discourse then? This is the turning point in this sort of exercise. In the past, Governments have been able to assume that although there may be controversy, strong political leadership will drive through the favoured solution, and the controversy will die away with time. Indeed, some would argue that this has now occurred with GM crops in the UK. It is fallen a long way down the list of issues in opinion polls on which the public express concern. The step by step approach announcement in April 2004 on the basis of the public debate has provided reassurance against immediate commercialisation, and some reassurance to particular interest groups including organic farmers. But it would be wrong to assume that the issue is dead. As and when a commercial cultivation regime commences, it is likely that there will be an awakening of the sleeping dog.

In other contexts, therefore, thinking is now being applied to so-called "upstream" engagement. This was the subject of a detailed paper prepared by a special task force on nanotechnology set up jointly last year by the Royal Society ("RS"), and the Royal Academy of Engineering ("RAE"), in the belief that without careful advance thought, nanotechnology would become the new GM crops, with controversy quickly spiralling out of control and harming the development of the technology. The upstream approach to engagement clearly has attractions provided it is sophisticated enough to avoid crude salesmanship. Its purpose is to understand what are the concerns that people may have about the development and use of the technology, and the societal expectations of its applications, so as to develop a mature appreciation of potential risks and benefits. Where the public reception of GM foods depended upon the resistance to pesticides of a handful of unexciting crops, upstream choices about nanotechnology can be informed by a range of existing and potential product lines, including medical applications. Already one of the leading nanotechnology labs has hired a social scientist to educate scientists about the societal issues involved as the technology develops.

But how can this be developed into a new mechanism for public engagement around new technologies more generally? The joint RS/RAE report argued in Recommendation 21 for the Government's Chief Scientific Adviser to "establish a group that brings together representatives of a wide range of stakeholders to look at new and emerging technologies". This has been translated by the Government into something rather different, which is a new horizon scanning centre that was being established anyway.

In a paper published recently by Demos[9], a leading think tank in this area, an argument is made that:

> *. . . the AEBC provided a new model for inclusive, independent scientific advice. The diversity of its members, drawn from all sides in the debate, meant that it was widely respected. With its demise, we have lost an important voice in British science policy. We believe that the government should build a more radical and wide-ranging body form the ashes of the AEBC, that can fulfil the spirit of recommendation 21 and advise on the long-term implications of new and emerging technologies.*

This may well be the Commission's legacy. It did demonstrate that it is possible to bring together a group of experts with highly diverse backgrounds and world views, in one of the most controversial areas of public policy, to cause them to explore each other's positions and the values that underpin their approaches, and to bridge the gaps in which controversies grow. It is an open and transparent approach, based on structured argument and open public engagement rather than upon quasi-judicial hearings. The most important role is to ensure that social and ethical issues can inform and prioritise scientific and technological development, not to the extent of determining research agendas but in developing an understanding that science and technology are part of, not apart from, civil society.

9 Wilsdon, James, Wynne, Brian, Stilgoe, Jack *The Public Value of Science* (2005)

APPENDIX 1

PUBLICATIONS OF THE AEBC

Listed in reverse chronological order

What shapes the research agenda in agricultural biotechnology? ..... 28 April 2005

Information and analysis paper ..... 28 April 2005

Analysis of responses to written consultation ..... 28 April 2005

Plant breeding case study ..... 28 April 2005

Soil science case study ..... 28 April 2005

A consultation with the general public and stakeholders ..... 28 April 2005

Public engagement exercise on non food agriculture ..... 7 April 2005

Biotechnology Commission Open Letter Response to the FSEs ..... 14 September 2004

Biotechnology & Farming ..... 30 June 2004

AEBC Annual Report 2003 ..... 12 February 2004

Coexistence & Liability Report ..... 25 November 2003

AEBC Annual Report 2002 ..... 29 October 2002

Animals and Biotechnology ..... 3 September 2002

A debate about the possible commercialisation of GM crops ..... 26 April 2002

Horizon Scanning ..... 17 April 2002

AEBC Annual Report 2001 ..... 30 October 2001

Crops on Trial ..... 10 September 2001

APPENDIX 2

THE AEBC

Terms of reference

In 1999 the Government reviewed its advisory and regulatory framework on biotechnology. It concluded that a broader approach was needed for strategic issues. The Agriculture and Environment Biotechnology Commission ("AEBC") forms part of the new strategic framework.

The Commission will:

- Offer strategic advice to Government on biotechnology issues which impact on agriculture and the environment.
- Liaise closely with but not duplicate the work of the other two bodies which together with the AEBC form a new strategic advisory framework i.e.:
  - The Human Genetics Commission (HGC) which will advise on genetic technologies and their impact on humans; and
  - The Food Standards Agency (FSA) which will include within its responsibilities all aspects of the safety and use of genetically modified food and animal feed;

- Keep under review current and possible future developments in biotechnology with actual or potential implications for agriculture and the environment;
- Advise Government on the ethical and social implications arising from these developments and their public acceptability; and
- Consider and advise on any specific issues relating to relevant aspects of biotechnology as requested by the Government.

As part of this process the Commission is expected to:

- Identify any gaps in the regulatory and advisory framework;
- Consider the wider implications of the lessons to be learned from individual cases requiring regulatory decision;
- Advise on any changes which should be made to Government guidelines which regulatory bodies are required to follow;
- Make recommendations as to changes in the current structure of regulatory and advisory bodies;
- Co-ordinate and exchange information with the relevant regulatory and advisory bodies;
- Seek to involve and consult stakeholders and the public on a regular basis on the issues which it is considering; and
- Operate in accordance with best practice for public bodies with regard to openness, transparency, accessibility, timeliness and exchange of information.

The Commission will:

- In carrying out its work take into account European and global developments;
- Nationally, adopt a UK perspective taking appropriate account of legal and other differences between England, Scotland, Wales and Northern Ireland; and
- Draw up a work programme.

The Government may also ask the Commission for advice on a particular issue and, if necessary, direct it not to become involved in an area if this could be better handled elsewhere.

* In the context of the work of the Commission 'Government' comprises the UK Government and the devolved administrations.