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Milking Genes for All They're Worth: A Case Study of Biotechnology Foresight in New Zealand*

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Abstract

In 1999, following a Foresight Project, the New Zealand Government released an investment portfolio for research and development. Concurrently, the Green Party initiated a Royal Commission on Genetic Modification to consider the ethical, social and scientific issues associated with agricultural biotechnology. This study evaluates the discourse used by stakeholders to debate the use of genetic modification in food production. It concludes that though these two formal methods of public consultation failed to achieve a unifying social and political consensus around genetic modification in agriculture, the exercises advanced the broader goal of iterative stakeholder foresight and innovation.

That was in the past. We're in the future now.
David Beckham, Real Madrid[1]

Introduction

This article reports the results from a case study (1997-2004) of the development of a public strategy for agricultural biotechnology in Aotearoa/New Zealand. It focuses on the way in which large-scale public consultation methods such as national foresight interact with issue framing by stakeholder groups to generate policy and political outcomes. In 1999, the New Zealand Government released a $223 million (NZD) public investment portfolio for research and development that resulted from the national Foresight Project launched in 1997. Agricultural biotechnology figured prominently in the sectors targeted for investment and growth. Also in 1999, the Green Party of Aotearoa/New Zealand successfully argued for the implementation of a Royal Commission on Genetic Modification (RCGM) to consider further any ethical, social, cultural and scientific perspectives on the use of genetic modification (GM) in

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New Zealand crops and food products.

Despite this unique combination of two formal methods of public consultation conducted over five years (1997-2001), the GM food issue remains a potentially volatile subject, and continues to be a pivot point between two intractable visions of New Zealand's future. This case study uses framing analysis to evaluate how the rhetoric and conceptual categories used by two representative stakeholder groups to debate agricultural GM reflect underlying worldviews that are both resistant to change and antagonistic. The approach is informed by M. Hajer's discussion of how analytical comparisons of policy vocabularies, storylines, myths, and metaphors can "be drawn upon to disentangle the fight over meaning that accompanie[s] the implementation of [a] policy scheme." (Hajer 2001: 5)

The Green Party represents a visible and institutionally legitimate stakeholder group not only opposed both to field trials and commercial release of GM food, but also in favour of an agricultural policy that would shift New Zealand, by the mid-21st century, from pastoral and corporate farming to 100% certified organic production. Section 1 of the *Green Party Agriculture and Rural Affairs Policy*, under the heading Organic Nation, states "we regard organic produce as the ultimate in value-added product – the value lies in the essence of the product itself, rather than in the processing and presentation." (Green Party 1999) The alternative stakeholder view analysed herein is represented primarily by Fonterra (a global dairy producer and New Zealand's largest company), and Federated Farmers of New Zealand, Inc. Both organisations assert that genetic modification must remain an option for farmers, and that farmers/producers should have the right to implement production methods most suitable to their environmental and marketplace conditions. The voluminous policy statements, witness briefs, press releases, and speeches given by these three representative groups on the issue of genetic modification in agriculture from 1997 – 2004 are the major data sources for this analysis.

The case study begins with a brief introduction to contemporary New Zealand politics and institutions in order to provide a context for evaluating the agricultural sector. It then considers both consultative exercises – the Foresight Project and the Royal Commission on Genetic Modification – before proceeding to an analysis of the major stakeholder frames/worldviews that make successful resolution (as measured by the creation of a unifying consensus across stakeholder groups) of the GM food issue difficult, perhaps impossible. The article concludes that the decision not to address fundamental cleavages in social and economic ideologies at the outset of either the Foresight Project or the RCGM meant that the possibility of achieving broad-based consensus on GM food in New Zealand would be miniscule, no matter which consultative method was chosen and regardless of how skilfully it was implemented. The GM food debate is a proxy for a political conflict that revolves around core economic ideologies and principles and is therefore only partially about science and technology. Contesting the science of genetic modification (particularly in terms of acceptable risk levels and the safety of GM food) provides a legitimate discourse strategy for the Green Party to advance a vision of New Zealand as an Organic Nation. The Organic Nation concept, in turn, reflects a fundamental worldview that is anti-globalisation, defines environmental sustainability as incompatible with genetic modification (in food production), and would reintroduce farming policies such as tariffs and import substitution that were abandoned by the mainstream political parties in the 1980s. This vision is incompatible with the corporate sector's frame (Biotechnology Hub), in which "the major social and economic risk to New Zealand (and to the New Zealand dairy industry in particular) is that the New Zealand dairy industry will be prevented from developing and using GM, while its competitors are not." (New Zealand Dairy Board 2001)

Against the backdrop of this case study of biotechnology governance, the article's conclusion also addresses fundamental issues regarding the emergence of a foresight culture in New Zealand. It concludes that though the two for-

mal methods of public consultation (1997–2001) failed to achieve a unifying social and political consensus around genetic modification in agriculture, the exercises advanced the broader goal of iterative stakeholder foresight and innovation. Examples of current technology planning, such as the Futurewatch programme recently launched by the Ministry of Research, Science and Technology (MoRST), and the Future Insight method developed by Forest Research (a Crown Research Institute), strongly suggest that though the label "foresight" is now rarely used, New Zealand continues to adapt and apply the essential principles of scenario planning, stakeholder dialogue and standing in the future, to the twin goals of technological innovation and adaptation.

Institutions and Politics in Contemporary New Zealand

The New Zealand primary sector is "the only sector in which New Zealand currently has world-class scale and specialisation." (Prime Minister Helen Clark, 2002) According to the Arable Food Industry Council (AFIC), the value of the total arable industry to New Zealand is approximately $1.5 billion annually, represents 15% of New Zealand's agricultural GDP, and employs 19,000 people. (Polson 2002) The agricultural sector accounts for 16% of New Zealand's total workforce, comprises approximately seventy thousand farms covering 15.1 million hectares, and includes a mix of dairy, arable, and horticultural farming in a country with a population of 4 million people. (Lambie 2003)

The economic and social consequences of serious strategic mistakes in this sector would thus be high, particularly since the pastoral family farm is also a cultural touchstone in New Zealand's collective memory. John Lancashire argues "our economy is distinguished by its dependence on agricultural commodities, meaning that we take what prices we can on the international market . . .we would earn more from our food products if were in control as 'price makers', which can result from a greater emphasis on more specialised value added products." (Lancashire 2003) As emerging commodity sectors in countries such as Brazil and Chile begin to make inroads into New Zealand's export markets, New Zealand must increasingly rely on the production of value-added food products (so-called "smart biotechnology" such as nutriceuticals) rather than trying to compete on labour costs. Most of the major corporate players in the agricultural sector see the ability to extract added value from commodity crops through scientific tools such as (but not limited to) genetic modification as crucial to productivity and competitiveness in the global marketplace. Conversely, the Green Party believes the ultimate smart biotechnology is organic production. This confluence of technology (GM), politics (the Foresight Project and the RCGM), culture (embodied in New Zealand's "clean and green" national slogan), and economics (the agricultural sector) guaranteed that the debate about GM would generate substantial media coverage and public interest throughout the Foresight Project and the Royal Commission on Genetic Modification.

Genetic modification in agriculture also emerged as a salient issue at the same time that New Zealand society experienced significant changes in national political institutions, as well as in the relationship between Māori and New Zealanders of European descent. The Treaty of Waitangi (Te Tiriti o Waitangi), signed in 1840 by Māori chieftains and representatives of the British Crown, specifies the founding bicultural principles of Aotearoa/New Zealand.[2] Conflicting English and Māori language versions of the Treaty exist, and contemporary social politics in New Zealand focuses intently on how to set up an equitable bicultural society that also rectifies past injustices committed against the indigenous (Māori) population by colonial immigrants. Post-modern analyses extending from political and literary scholarship in the 1970s and 1980s provide an intellectual foundation for the contemporary Māori renaissance in language, rights, and cultural contributions on both the local and global stage.[3] The formal adjudication of Māori land claims, customary rights to indigenous flora and fauna, and mone-

tary reparations are ongoing processes that frequently generate social conflict. They are also relevant to the GM food issue in that Māori stakeholders could hypothetically bring claims against the Government if genetic modification, imposed from outside the community and without their consent, conflicts with their customary rights to dominion over native flora and fauna.

In 1996, New Zealand also changed from a first-past-the-post (winner take all) electoral system to mixed member proportional representation (MMP). Modelled technically on the German proportional representation (PR) model in terms of the 5%-of-the-vote threshold for party representation in Parliament, and modelled intellectually on the argument that PR electoral systems represent diverse social and economic interests more democratically, the shift to MMP created in its early incarnation an amalgam of a consensus-based electoral system embedded within a polity still accustomed to the conflictual Westminster style of national politics. An overarching goal of the Foresight Project, for instance, was to identify key economic sectors and to develop consensus-based strategies for moving the country to more innovative production methods. However, public consultation processes cannot be separated from national culture and institutions. Given that the Green Party only emerged as a standalone political party in Parliament in 1999, and the fact that Māori cultural traditions regarding indigenous knowledge, native flora and fauna, and alternatives to Western scientific models now had formal legal sanction, the attempt by the Government to conduct foresight as a straightforward "rational" exercise in technocratic planning was almost certain to fail. What was intended to be a participatory exercise quickly became a contested site wherein competing visions of the Organic Nation and the Biotechnology Hub could be brought forward for public scrutiny.

Blueprint for Change: Foresight in New Zealand

Like many countries in the late 1990s, including Australia and the United Kingdom, the New Zealand Government (then dominated by the centre-right National Party) launched a formal Foresight Project under the authority of the Ministry for Research, Science and Technology (MoRST). MoRST (1998: 5) hoped the Foresight Project would "encourage an ongoing process of strategic thinking across diverse communities, as a basis for developing a coherent and forward-looking view of needs and opportunities for new knowledge and technological change". The Government wanted to unlock the tacit knowledge held by various sectors in New Zealand, and promoted foresight as a national conversation between and across stakeholders, with a goal of prioritising the most promising sectors for public investment in the 21st century. MoRST also encouraged stakeholders to redefine traditional sector definitions, think about possible new clusters and sectors, and to generate optimal 2010 investment strategies/futures for their sector. The Foresight Project had the support of political parties across the parliamentary spectrum. The consultation included two major public conferences (1998), a preliminary analysis of initial foresight submissions (which generated 17 draft outcomes), publication of a draft report on target outcomes in December 1998, and then a final analysis of submissions received on this draft that resulted in a formal statement (the *Blueprint for Change*) of the Government's 14 priority outcomes:

1. Wealth from new knowledge-based enterprises
2. Innovative manufacturing and service enterprises
3. Sustainable use of natural resources
4. Wealth-creating food and fibre industries
5. Future-focused global intelligence
6. Infrastructure for a knowledge society
7. People with knowledge, skills and ideas
8. Strong families and communities
9. Máori development
10. Vibrant culture and identity
11. Health for all
12. People living in safe and healthy environments
13. Health, diverse and resilient ecosys-

tems

14. New Zealand in the global biophysical environment

The *Blueprint for Change* (1999) also provided tangible evidence that the foresight process generated a new way of thinking about innovation and investment, as the Government now couched its aims in terms of portfolio outputs – with the outputs linked specifically to developing a knowledge society in New Zealand – rather than focusing, as in the past, primarily on how much money it intended to allocate across the traditional R&D agencies. As MoRST (1999) noted "in contrast to past Government statements concerning research, science and technology (RS&T) policy, this blueprint identifies *what Government seeks to achieve through its investment*, rather than how much it proposes to spend." (emphasis original, 5) The incoming Labour-Alliance Government (elected November 1999), a centre-left coalition, adhered to the fundamentals of this new portfolio strategy, despite reversing National Party policies in areas such as tertiary education, labour relations, and social welfare. MoRST (1999: 5) thus thought it could legitimately assert that "the Foresight Project has created a strong focus on innovation needs and is building new relationships and networks across many sectors".

This positive evaluation of the Foresight Project did not match the criticisms coming from the science and corporate sectors, and the Labour-Alliance Government ultimately removed the Foresight Project from the MoRST website.[4] Many stakeholders and observers openly criticised the Foresight Project, their objections coalescing around the argument that it had become a bureaucratic (read: wasteful) use of public funds that had accomplished little in terms of improving New Zealand's international R&D profile or competitive position. For instance, Malcolm Bailey (1999), then President of Federated Farmers, concluded in *New Zealand Farmer* that the Foresight Project "highlights how seemingly good ideas can end up as a giant waste of time and money," and castigated the priority outcomes as "little better than warm and fuzzy sociological commentary that has no practical value in determining how public money should be allocated for science research." Peter Pockley (1998: 20), in a article published in the *New Zealand Science Review*, also criticised the Foresight Project for focusing on reprioritising a shrinking pool of public investment funds among a group of vested interests, rather than on the much more difficult task of improving "the nation's stalled and uncompetitively low level of private investment in science".

Part of this response could be attributed to the natural "let down" that characterises the end of specific foresight projects. A *Foresighting Europe* summary of a foresight workshop held in Brussels (July 2002) notes "good [foresight] exercises sometimes suffer, after the first wave of initial conclusions are published. Sometimes there is an anti-climax as exercises present their initial findings." (DG Research 2003: 9) However, this phenomenon cuts across national foresight exercises, and cannot explain the specifics of the Foresight Project's failure in the New Zealand case. The project must therefore be understood within the set of contemporary cultural and political factors discussed in the previous section. For instance, in *Building Tomorrow's Success: Guidelines for Thinking Beyond Today* (an introduction to the Foresight Project), MoRST (1998) asserted that building a rational and productive science and technology investment policy across New Zealand sectors and societies "depends on all groups sharing a common long-term view of the future." It further specified four key phases of foresight:

1. Establishing a context for thinking about the future;
2. Developing a widely shared and compelling understanding of what is important to achieve;
3. Decision making about priorities for science and technology;
4. New priorities and investment processes coming into operation.

Finally, it noted the "four principle areas" of Foresight included economic competitiveness, the capacity to innovate, sustainable resource use, and social cohesion and quality of life. MoRST assumed that all groups in New Zealand

shared a basic orientation to the "long-term view of the future," and because this assumption was never tested prior to launching further stages of the foresight exercise, the process – particularly in terms of reaching unifying consensus on the use of genetic modification in agriculture – essentially broke down at stage two (above). Without agreement on the basic economic direction of the country – in other words without a fundamental agreement on issues such as globalisation, and the meaning of concepts such as knowledge society, sustainability, and smart biotechnology – there could not be agreement on priorities.

For example, following the *Foresight: Using Gene Technologies Conference* in June 1998 (Auckland), the Health Research Council of New Zealand (1998a: 5) prepared a discussion paper that noted "genome data and genotyping is revolutionising our dairy industry from herds through processing to marketing. Milk processing and the performance of milk products are now increasingly determined by genetic factors". Similarly, an *Environmental and Occupational Health Sector Strategy* submitted to the Foresight Project defined Smart Biological Industries (SBI) as "high tech alternatives for generating high-value market opportunities from our biological resources." (Health Research Council 1998b) While SBI was not synonymous with genetic modification, clearly the intention was to harness the power of science and genetics to extract knowledge and value from primary commodity products. The Green Party, however, had spelled out core political principles on biotechnology in its founding charter (on file with the New Zealand Electoral Commission) that were not amenable to any foresight exercise, no matter how well executed, that resulted in support for genetic modification in agriculture, particularly where this support opened the door to the potential commercial release of GM foods. The Green slogan "keep it in the lab" refers to the Greens' acceptance of products such as recombinant human insulin, as well as basic laboratory research on the use of genetic modification in health/medicine. The Greens, however, not only oppose commercial release of genetically modified crops, but also build their formal economic/agricultural platform around a definitive shift, over time, to comprehensive organic farming. Moreover, following the Foresight Project, the Green Party and associated anti-GM interest groups publicly challenged the idea that genetic modification and sustainability were compatible goals. Consequently, despite the Foresight Project's conclusion that [smart] agricultural biotechnology was key to sustaining New Zealand's position in a global agricultural marketplace, the Green Party continued to critique the science undergirding genetically-modified foods, and ultimately succeeded in their request for a Royal Commission of Enquiry into Genetic Modification (RCGM) to consider the social and cultural, as well as scientific, implications and risks of genetic engineering.

Proceed with Caution: The Royal Commission on Genetic Modification

Established in May 2000, the RCGM concluded in July 2001 after approximately fourteen months of deliberation, and at a cost of $6.2 million NZD spent on hearings, public submissions, and consultation. The RCGM was unprecedented internationally, and the public consultation mechanisms include 15 public meetings, 11 hui (formal Māori consultations on a marae), 29 workshops, one youth forum and 13 weeks of hearings to receive the testimony of 107 stakeholders who had formally registered as Interested Persons. Over 10,000 public submissions were made to the Commission.[5] In its report to the Government, the RCGM (2001: 349) concluded that there was an "urgent need for the development of a biotechnology strategy for New Zealand." (implicitly signalling that the Foresight Project had not produced one) It argued that the aim of this strategy should be "to ensure that New Zealand kept abreast of developments in biotechnology, and that these were used to national advantage while preserving essential social, cultural, and environmental values". For corporate stakeholders such as Fonterra, the RCGM represent-

ed a flawed but comprehensive process, and the conclusion to "proceed with caution" could be accommodated. Craig Norgate (2001b), then CEO of Fonterra, stated the "process has delivered a path forward where our scientists can say, 'yes, it's not ideal, but it remains within the bounds of what we can work with.'" The Green Party, however, despite the fact that it had earlier argued that a "Royal Commission is the best way of contesting and demolishing myths on both sides and getting as close to the truth as possible" (Fitzsimons 1999: 21), politically could not accept any recommendations to lift the moratorium on the commercial release of GM foods in October 2003, nor those that opened a channel for use of genetic modification in commodity crops. As the next section demonstrates, the intractable policy divide between the Green Party and the large corporate sector (represented by Fonterra and Federated Farmers of New Zealand, Inc.) could not be resolved through normal participatory or consultative channels because each point of view reflected not only different interpretations of science and risk, but bedrock economic worldviews that are highly resistant to change.

The Hidden Potential of Milk: Biotechnology Discourse in New Zealand

Discourse analysis of the rhetorical debate between the Green Party and the corporate sector over genetically-modified foods in New Zealand indicates that while the debate was primarily cast in terms of disputes over the science of genetic modification (GM), particularly with respect to risk assessment and consumer safety, science operated less as a baseline for decision-making than as a discourse strategy through which GM opponents could keep the issue in play. That is, science served as a rhetorical device through which each side could advance the underlying epistemic worldviews that constituted the real political point of the controversy.

Fonterra and Federated Farmers of New Zealand, Inc., for instance, asserted that biotechnology, innovation, and environmental sustainability are synergistic, with Craig Norgate (2001c) referring in a speech to "a race to unlock the hidden potential of milk that new science is bringing into focus." This "hidden potential" would produce "riches for the first to unlock the value, and commercialise it, and bring new products to market which line up alongside consumers' desire for healthier nutrition." The Green Party, conversely, in its pursuit of the Organic Nation vision, continuously linked GM food to health disasters "like thalidomide, DDT and nuclear power stations [presumably a reference to Three Mile Island and Chernobyl] – promoted as safe by their vested interest producers, but catastrophic in their downstream effects on our children and their children." (Green Party 1999) Throughout the Foresight Project and the RCGM, Green Party members promulgated, in particular, a semiotic link between opposition to GM food and opposition to nuclear power. Given that New Zealand famously rejected visits from American nuclear powered ships in the mid-1980s, and was essentially kicked out of the ANZUS (Australian-New Zealand-United States) security arrangement as a consequence, the nuclear power/weapons issue continues to be politically potent in contemporary New Zealand. Indeed, New Zealand's anti-nuclear policy exemplifies a unifying consensus – the type each major stakeholder hoped to achieve with respect to GM food – as opposed to the "proceed with caution" majority consensus reached by the RCGM. The Green Party thus emphasised a "GE Free New Zealand" slogan in its opposition strategy, banking on both the historical resonance of the slogan "Nuclear Free New Zealand" and the continued strong support across the political spectrum for the anti-nuclear stance. Ian Ewen-Street (Green Party Agricultural Spokesperson) argued, for example, "the task before us is similar in style and magnitude to the struggle to become nuclear free in the 1970s, with the majority of the people wanting one thing and the government heading full steam in the opposite direction." (Ewen-Street 1999)

Just as New Zealand opposition to nuclear power simultaneously reflects a specific issue

and also operates as a potent national symbol of pacifism and international peace in world politics, the "GE Free New Zealand" slogan references a Green Party economic worldview that encompasses much more than genetically modified/genetically engineered foods. Likewise, ending the moratorium on the commercial release of GM foods mattered to corporate interests like Fonterra not so much in terms of the specific October 2003 deadline, but instead as an important symbol of producer choice and autonomy with respect to farming methods. By August 2003, Federated Farmers conceded that "the commercial production of GM commodity crops in New Zealand is extremely unlikely given few of the commercial GM crops currently available are beneficial to New Zealand conditions and production types." (Ritchie 2003) Moreover, even with the October 2003 sunset of the moratorium on commercial release, both GM field trials and commercial releases initiated in New Zealand must clear the regulatory hurdles of the Environmental Risk Management Authority (ERMA). It remains unlikely that there will be a rapid "rush to market" with respect to GM crops in New Zealand, though slow integration of approved GM ingredients and products from abroad continues, as regulated by the Food Standards Authority Australia New Zealand. In its submission to the RCGM, the New Zealand Dairy Board (2001: 71) argued that although "organics has a valuable niche role to play in New Zealand's agricultural export industry . . . farmers and consumers should have a choice of systems to use and products to buy." Federated Farmers also supported lifting the moratorium on the grounds that farmers must compete in highly diversified markets and therefore must have the ability to implement production systems relevant to the particular market niche that they are targeting in a given instance. For Federated Farmers, Green opposition to lifting the moratorium meant that the party wanted "to lock producers into a one size fits all view of the marketplace." (Ritchie 2003)

It is difficult to see how either the Foresight Project or the Royal Commission could have resolved the rhetorical configuration of the moratorium as a stark choice between "freedom of choice" or "contamination". Irrespective of its scientific basis, the moratorium on GM food became the symbol of the ideological divide between corporate agricultural producers and the Green Party. The latter argued that a "choice" to use genetic modification in food production would destroy "New Zealand's rapidly growing organics industry through contamination" (Green Party 2003), while Fonterra argued that "if the concept of a Knowledge Society is to have meaning in a New Zealand context, it must include biotechnology in all its forms." (Norgate 2001a) From the corporate standpoint, extending the moratorium past October 2003 would only needlessly prolong the discursive "back-and-forth" regarding risk assessment and regulatory protocols. Yet for opponents of GM food, lifting the moratorium signalled capitulation to what Ian Ewen-Street termed an "unholy alliance between the multinational food corporations and our extreme right wing political masters." (Ewen-Street 1999)

Discussion

M. Hajer (2001: 7-8) argues that the most abstract level of political discourse concerns epistemic notions, "a regularity in the thinking of a particular period, structuring the understanding of reality without actors necessarily being aware of it." This analysis of New Zealand's biotechnology governance concludes that it is because of intractable epistemic notions that both the Foresight Project and the RCGM failed to reach a unifying consensus. Multinational agricultural producers such as Fonterra contend that there is "no contradiction in delivering to our shareholders and to New Zealand at the same time. There is no contradiction in performing commercially, socially and environmentally at the same time." (Norgate 2001d) Similarly, in a speech titled "Distorting Market Signals: The New Zealand Experience," Tom Lambie (President of Federated Farmers) traces the difficult transition for New Zealand farmers in the 1980s and early 1990s from a heavily regulated social welfare model to neo-liberalism and globalisation. He

highlights the "cold turkey" programme of 1984, in which "almost overnight NZ pastoral farmers went from 33% of their gross incomes being subsidised to being on their own" (Lambie 2003), and the speed with which the Labour Government ended tariffs, applied market interest rates to credit, and terminated concessionary rural farm loans (policies also supported by the National Government in the 1990s). For Lambie, the key lessons are that New Zealand farmers not only survived, but also prospered within the neo-liberal regime, and that Federated Farmers' task today "is to be vigilant in its attack on costs and government intervention." (Lambie 2003)

This epistemic framing of agricultural policy, with its emphasis on globalisation, free trade, and access to all forms of scientific innovation, directly conflicts with the Green Party's formal Agriculture and Rural Affairs Policy. The policy states, "so-called free trade has created enormous social and ecological problems, particularly in third world countries and threatens the sovereignty of nations such as New Zealand." (Green Party 1999) A position paper by Ian Ewen-Street further proposes interest free loans to support farmer conversion to organic production, the re-introduction of farmer advisory services (funded via the taxpayer), and the reintroduction of tariffs and import substitution. (Ewen-Street 1999) The Green Party position on agriculture would reinstate the sectoral policies conclusively rejected by both the Labour Party and the National Party in the 1980s and 1990s. At the epistemic level, then, debating the safety and the science of GM food provides a plausible strategy through which the Green Party can keep their ideological preference for the Organic Nation – and the related preferences for local production over global production, small-scale public research initiatives, and heavy regulation of exports and imports – on the political agenda. The uncertainty and doubt that characterises best practice in science becomes, in this case, a tool for the continuous recycling of competing experts and competing studies on GM food through multiple channels of public consultation. Debating GM food is a proxy for what is actually a clash between organised economic ideologies.

At a more practical level, the Foresight Project also failed to shift funding for research and development. The country continues to score low, within the cohort of advanced industrialised countries, in terms of total R&D investment as a percentage of Gross Domestic Product (GDP). In December 1998, the Foundation for Research, Science and Technology's (FRST) newsletter noted that "when comparing the R&D of various OECD nations New Zealand stands out for its low expenditure as a percentage of GDP, the dominance of Government as the only major investor, and the low number of scientists per 100." (FRST 1998) Six years later, Andrew West, Chief Executive Officer of AgResearch, argued that "until we recognize that R&D is truly essential to productivity, for example in the area of biotech, and that no amount of discussion can actually make up for hard cash, New Zealand won't be racing up the OECD ranks." (West 2004) To illustrate these points, New Zealand's R&D investment as a percentage of GDP fluctuated in the timeframe 1998 – 2004 around the 1% mark. Figures from 1999, for example, show that New Zealand's investment was approximately 1.13%, compared to Australia (1.5%, 1998), Sweden (3.80%), Finland (3.22%), Japan (2,93%), USA (2.65%), Ireland (2.32%), UK (1.87%), and Canada (1.85%). (Eiseman, Koizumi and Fossum 2002)

Moreover, criticism of the foresight outcomes – as they developed through various stages – was especially vehement among major segments of the corporate and research sectors. Mark Grimes, writing for the New Zealand Association of Scientists, stated:

> *Foresight alone has cost MoRST more than $1 million. When we observe marketing campaigns to promote the value of science to society, coupled with decreased actual investment in science, we must question the motives behind the marketing campaigns. Unfortunately, while many of us view the MidSight and other Foresight conferences as constructive exercises that promote dialogue between scientists and business people, the Foresight documents' gobbledygook*

has done more to alienate both scientists and business people than to rally them. (Grimes 1998)

The Meteorological Society of New Zealand took a more muted approach, first noting "we think this [Foresight] is a worthwhile objective . . .to provide a basis for helping establish the direction that science should take within New Zealand," but concluding that it is "disappointing to see the lack of applicability in the list of . . .target outcomes in the Foresight. These outcomes can be seen as being feel-good phrases that are difficult to interpret in terms of hands-on science." (McDavitt 1998). Finally, as a third example, Ian Reilly (1999), in a scathing evaluation of the final *Blueprint for Change*, written on behalf of the New Zealand Geophysical Society, asserted that by outcome #14, "in the final paroxysm, the metaphor of metaphors, we leap aboard our Harley-Davidson and roar off into the global biophysical environment of the knowledge society!" He concluded "if the *Blueprint for Change* is the best that it can produce at the end of two years of consultation and the expenditure of millions of dollars, then the Government should abolish MoRST and begin again. Its continued existence tarnishes the reputation of New Zealand science."

In summary, this case study of the New Zealand Foresight Project provides support for Jewell and Sripaipan's (1998: 1) assertion that authority, legitimacy and credibility are the "three closely linked issues which are recognised as fundamental to the success of all foresight exercises". The overall response of the science sector to the Foresight Project indicates that MoRST failed to translate the 14 priority outcomes into tangible goals that the science and corporate sectors could support as clear and strategic guidelines. By late 1999, the Foresight Project receded as the incoming Labour Government sought to position itself as the champion of New Zealand's knowledge society by hosting the Knowledge Wave (2001) conference in Auckland. This conference actually extended from much of the Foresight Project work, and further promoted the idea of smart investment in R&D organised around portfolios and outcomes. However, the phrase "foresight" was dropped from the bureaucratic lexicon, and the National Party received little public credit at the conference for contributing to a more dynamic New Zealand investment strategy.

Conclusion: From Foresight to Future Insight?

H. Bressers and W. Rosenbaum (2000) argue that "so much of the scientific research essential for resolving policy conflict and for crafting appropriate policy is unavailable, ambiguous, or preliminary that scientific judgement frequently becomes highly contingent and tentative, almost inevitably contentious." This case study suggests that where consensus on national identity – on the type of society a country hopes to be – does not exist, scientific uncertainty can also be deployed as a rhetorical ploy to keep fundamental epistemic and ideological debates in motion, regardless of the quality of public consultation processes. In the GM case, conflict over science and risk assessment became a marker in an ideological battle, and served as a legitimate discourse/oppositional strategy in a post-industrial polity where openly debating the modernist divide between socialism and capitalism no longer has legitimacy. While the Foresight Project provided a discourse opportunity, and did help to frame a new portfolio approach to science investment, the call for a Royal Commission on Genetic Modification and the subsequent disappearance of "foresight" from New Zealand's science policy vocabulary, indicates that in the case of biotechnology governance the foresight exercise failed to achieve a workable consensus on New Zealand's future.

Three factors contributed to this failure: 1) an intractable ideological divide between the corporate agricultural sector and the Green Party; 2) the emergence in 2000 of an invigorated Labour-Alliance Coalition that actively sought to modify or, in some cases erase, nine years of National Party policy priorities; and 3) a widespread perception, following the release of the *Blueprint for Change* (1999), that MoRST had

not successfully leveraged the possibilities of the process, instead producing a mundane summary document replete with bureaucratic language and vague directives. Ultimately, as a technocratic and time-bound exercise, the Foresight Project, as demonstrated, did not work.

However, preliminary evidence from current Government and industry practice indicates that New Zealand continues to develop as a "foresightful" culture. The word "foresight" is no longer popular, due to its association with the late 1990s, but the major planning tools currently in use among several Crown Research Institutes, the dairy industry, and MoRST, implicitly reflect a commitment to "standing in the future" that incorporates (and innovates upon) most of the major foresight methods. For instance, Forest Research (CRI) recently unveiled Future Insight, "a rigorous planning process used . . .to identify major opportunities for New Zealand in the emerging renewable materials markets," that uses "a future horizon to 2025, detailed STEEP (Social, Technology, Economic, Environmental and Political) analysis, development of a suite of plausible global scenarios, technology forecasting and road mapping [and] analysis of likely change in business and market." (Butcher 2003:1) The process recently resulted in the public release of Forest Research's new "BioMaterial Futures" strategy, which reflects "a pivotal change . . .[that] will help industry to seize opportunities in future markets where renewable and biodegradable products will be the norm."[6] (Forest Research 2004:1)

The dairy industry's Future Focus programme also employs a suite of foresight tools including scenarios and stakeholder workshops. In partnership with AgSystems Social Systems Research Unit, the New Zealand Dairy Industry developed a strategic framework (2004-2012) based on extensive consultation with farmers across the country. The "innovative process [is] the first time that farmers will be able to have input into where their industry levy money will be spent." (Palminter 2002)

Finally, the Ministry of Research, Science and Technology recently launched the Futurewatch programme. MoRST defines futurewatch as "a kind of a 'radar', a way of systematically scanning the external environment . . . . Another aspect is thinking about the impacts of new science and technology in a broad way that brings in a range of perspectives, including those outside the science worldview." (MoRST 2004) The first Futurewatch report (MoRST 2005), *Futurewatch – Biotechnologies to 2025*, is an extensive evaluation of future trends and uncertainties in the broadly defined biotechnology sector, organized around three future scenarios: 1) Globalisation and Security (Biotechnology for Profit); 2) Conflicted World (Biotechnology for Basics); and 3) Sustainability Emerges (Biotechnology for Life).

After an interim period in which the Labour-Alliance Government downplayed the Foresight Project, and indeed removed the archive of it from MoRST's webpage, the essential tools of planning, scenarios, consultation, and ongoing feedback and re-evaluation of priorities have re-emerged in Futurewatch. This time, however, foresight works in a distributed, rather than centralized, manner. Despite the use of public consultation methods, MoRST's original concept of foresight operated largely as a "hub-of-the-wheel" configuration, in which directives emanated from the centre (MoRST) to various industry sector elites, who then replicated the configuration by soliciting scenarios and reports from employees. All of this information was then re-channelled upwards to MoRST, who ineffectually tried in the *Blueprint for Change* to tie this vast amount of material into a coherent plan.

Futurewatch, and the various planning processes being used by industry and Crown Research Institutes, replace centralization and plans with a distributed model that more accurately reflects the diversity of the New Zealand population and the uncertainties built into any form of technological foresighting. Rather than trying to tie each sector scenario to an overarching plan, the distributed model allows stakeholders – within broadly defined parameters, such as ERMA regulations – to develop and advance future strategies resonant to their

specific communities. The epistemic and intractable worldviews surrounding the use of genetic modification in food production remain. However, the new emphasis on local, sectoral and national conversations, rather than centralised plans, suggests that stakeholders can find multiple points of entry into the framing and policy process, rather than having always to form into antagonistic camps (as with the sunset of the GM moratorium in 2003). It may never be possible to reach, with respect to 21st century biotechnologies, the type of unifying consensus that emerged in 1980s New Zealand around the nuclear-free issue. What thus becomes necessary in technology foresight is to recognize that the integrity "of the process, or means of getting the answer, is at least as important as the answer itself." (MoRST 2005:127) Futurewatch, in this regard, reflects an evolution of the participatory norms that inspired the original Foresight Project.

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Notes

1. *Football Player Quotes*, http://www.geocities.com/SouthBeach/Palms/6687/players.html Accessed February 10, 2005.
2. The designation Aotearoa/New Zealand refers to the formal name for this bicultural nation-state. The generic term New Zealand, however, is also commonly and appropriately used in policy discourse.
3. See, for instance, M. Durie (2002) and M. Dodd (2002) for an extensive discussion of Maori development policies post 1984.
4. When research for this article began, the Foresight Project records could still be found at http://www.morst.govt.nz/foresight/info.html. The electronic archive included discussion documents, issues of an electronic bulletin (*The Foresight Flash*) and the online discussion thread. Though the site is no longer accessible, the author retains copies of the pertinent public documents and is happy to make these available to other scholars working on these issues.
5. The Royal Commission on Genetic Modification provides access to most of the documents generated in the investigation. In addition to the final report, interested scholars can access the Interested Persons submissions, transcripts of the testimony, and additional information considered by the Commission in its deliberations. Available at: http://www.gmcommission.govt.nz
6. Forest Research changed its trading name to Scion on 1 June 2005. The change is part of a re-branding effort designed to position the institute as a world leader in "next generation biomaterials."

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