

Scope of this submission

Friends of the Earth's interests in innovation policy are broad, but this submission will focus on the key area of emerging technologies, particularly nanotechnology. Our submission will outline how nanotechnology development in Australia has been characterised by short-sightedness, a failure to manage adequately its public interest challenges or to involve the public in policy development, 'blue sky' economic forecasting and unwillingness to assess critically its likely economic challenges. We will offer our proposal for how a new board of technology foresight and assessment could address these deficiencies, and by embedding deliberative measures in its core functions, deliver new technology development that maximises social and environmental utility and reflects public preferences and priorities.

“Can we imagine a better world? Are we asking the right questions?”

Friends of the Earth Australia applauds the review committee for putting this critical question at the top of its list. Innovation, and hence national innovation policy, can play a powerful role in affecting societal, economic and environmental change. By identifying and supporting priority areas for research and development and shaping the governance context in which new technologies such as nanotechnology emerge such policy can have a profound impact on the nature and trajectory of technology development. It is therefore critical that we interrogate the potential benefits of technology development alongside its potential costs and challenges, and that we weigh up the opportunity costs of pursuit of one technology over another. Furthermore, in addition to asking “Are we asking the right questions?”, we must ask “Are we involving the people affected by this policy in its development?”. Technology development should reflect not only commercial but also community needs. Public participation is essential to ensure that innovation policy is not only strategically sound, but is informed and guided by public preferences and priorities.

Considering the longer term implications of new technology development is particularly important where those new technologies are predicted to have large-scale transformative effects, as is the case with nanotechnology. Governments and business leaders world wide suggest that we are on the cusp of a nanotechnology-enabled “revolution” that will transform every sector of industry, bringing far-reaching changes to economic, social and ecological relations. The Asia-Pacific Economic Cooperation (APEC) forum notes that: “If nanotechnology is going to revolutionise manufacturing, health care, energy supply, communications and probably defence, then it will transform labour and the workplace, the medical system, the transportation and power infrastructures and the military. None of these will be changed without significant social disruption” (APEC 2002). The Australian National Nanotechnology Strategy Taskforce states that nanotechnology “has the potential to fundamentally alter the way people live” (National Nanotechnology Strategy Taskforce 2006). Yet despite the dramatic scope of these predictions and the identification of nanotechnology as a priority for Australian research and development, to date there has been a dearth of critical discussion about the social, economic and environmental challenges that nanotechnology presents, and whether or not it is a strategically sound focus for Australian innovation.

Key weaknesses and deficiencies of Australian nanotechnology development to date

Failure to involve the public in decision making about a technology predicted to drive 'revolutionary' change

The former Industry Minister Ian Macfarlane stated his intention to develop a Nanotechnology Strategy that delivers “business certainty and public support”. However the failure to support any form of meaningful public participation in the development of the National Nanotechnology Strategy suggests that the Howard government was far more committed to delivering “business certainty” than it was to ensuring “public support” for nanotechnology. The irony is that as the experience of genetically engineered foods tells us, without public support, controversial new technologies face very uncertain business futures.

There are 3 principle reasons for the Rudd government to support a genuine, robust program of public participation in nanotechnology policy development and decision making.

- Recognition that people have a right to participate in decision making about a technology predicted to drive such widespread and disruptive change.
- Recognition that public participation in government decision making improves outcomes.
- Recognition that if industry and government do not involve the public in decision making, they risk running a repeat of the genetic engineering backlash.

Public awareness about nanotechnology remains extremely low. However as public awareness grows, so too will public questioning and challenging of a technology that is likely to have a huge disruptive impact on our lives, but that has been commercialised without our informed consent, in the absence of regulations to protect us from its risks and with research funding priorities that privilege commercial work over public interest science. Tokenistic consultation after decisions have already been made is inadequate. A broad based program of public participation is required that can inform decision making about research priorities, industry policy and governance. If these key stages of decision making do not reflect public preferences and priorities, it is highly unlikely that the emerging industry will attract public support.

Recommendation: Australian national innovation policy should include an explicit commitment to public involvement in the development of national strategies for emerging technologies.

Short-term thinking has failed to engage with the most critical emerging global developments over the next ten years and beyond

Nanotechnology is seen by some analysts as the platform that will underpin the ‘next industrial revolution’, capable of driving large-scale global change over the coming decade and beyond. The Asia-Pacific Economic Cooperation (APEC) forum observed some years ago that: “If nanotechnology is going to revolutionise manufacturing, health care, energy supply, communications and probably defence, then it will transform labour and the workplace, the medical

system, the transportation and power infrastructures and the military. None of these will be changed without significant social disruption” (APEC 2002).

“Options for a Future Nanotechnology Strategy”, released in 2006, is the most detailed of the Australian nanotechnology strategy documents released publicly. However despite its stated intention to provide options for Australia’s management of nanotechnology into the future, the Nanotechnology Taskforce report was almost silent on the challenges and implications of predicted global developments and a nanotechnology-driven ‘revolution’ in coming decades. Instead, the report’s focus was on promoting existing or near term nanotechnology, so-called ‘first generation’ nanomaterials and passive nanostructures now found in cosmetics, sunscreens, fabrics, paints and some food products. The narrow focus of the report was curious given that in its introductory sections the Taskforce stated that nanotechnology has the capacity to not only transform every sector of industry, but within a decade nanotechnology could bring changes “as significant as the impact of electricity or the microchipⁱ”. To suggest that nanotechnology could drive such substantive, fundamental and rapid change and to fail to investigate the near-term implications for industry, infrastructure, labour markets and broader society suggests extreme short-sightedness.

Recommendation: Australian innovation policy should commit resourcing for appropriate horizon scanning, foresight and assessment activities that enable informed analysis of the key near-term global developments surrounding emerging technologies and their likely economic, social and environmental implications.

No analysis of nanotechnology’s potential impacts on labour markets, commodity trade, or capacity to result in large-scale economic upheaval

“Options for a Future Nanotechnology Strategy” cited a prediction by industry analyst Lux Research Inc. that global sales of products incorporating nanotechnology could be worth US\$2.6 trillion by 2014 and declared that “based on our current share of global GDP, this potentially translates into A\$50billion in products and services incorporating nanotechnology in Australia.”ⁱⁱ However nowhere in the report was there any consideration that nanotechnology’s development may not deliver net benefits to the Australian economy. In a glaring omission, the Taskforce failed to repeat the Lux Research Inc. warning issued in its same report that nanotechnology will not deliver equitable profits across the board, but could replace markets for existing commodities, result in large-scale disruption to commodity markets, supply and value chains, and eliminate jobs in nearly every industry:

“Nanotech is poised to ripple through the economics and value chain of multiple industries, with every new corporate opportunity also representing a potential threat. It’s riskier than ever to invest in blue-chip companies for the long haul, as only the fittest and most adaptive will survive... Just as the British industrial revolution knocked hand spinners and hand weavers out of business, nanotechnology will disrupt a slew of multi billion dollar companies and industries”ⁱⁱⁱ.

Given Australia's reliance on export commodities that may be vulnerable to competition from novel new nanomaterials, evaluating the potential for nanomaterials to compete with and/ or displace existing Australian export markets is essential. A National Nanotechnology Strategy committed to rapid nanotechnology expansion based only on 'blue sky' economic forecasts, without critical analysis of nanotechnology's economic and labour market impacts, appears ill-informed. The failure to engage seriously with predictions that nanotechnology will drive large-scale economic upheaval appears reckless.

Recommendation: Australian innovation policy should be informed by critical appraisals of the near and medium term economic potential of emerging technologies, including a rigorous assessment of the potential for economic disruption or displacement of existing sectors or markets.

Failure to protect the public, workers and the environment from the novel risks associated with nanotoxicity

Despite recognition at the highest scientific level that nanomaterials present serious new toxicity risks to people and the environment, their commercial use remains effectively unregulated. In its 2004 report, the Royal Society recommended that nanomaterials should be treated as new chemicals^{iv} and be subject to new safety assessments prior to their inclusion in consumer products^v. The Royal Society further recommended that factories and research laboratories should treat nanomaterials as if they were hazardous^{vi}, and until the environmental impacts of nanomaterials are better known, their release into the environment should be avoided as far as possible^{vii}.

The world's second largest re-insurer, Swiss Re, has also advocated^{viii} a strict application of the precautionary principle in the regulation of nanotechnology. Swiss Re emphasizes that conservative regulation that puts health and safety first must be adopted, irrespective of uncertainties in scientific circles. It warns that unless such an approach is adopted, governments and industry may leave themselves vulnerable to huge future liability should the products of nanotechnology cause serious harm to people's health, as happened with asbestos. The Head of the Science Strategy and Statistics Division of the UK Health and Safety Executive has also recommended that rigorous regulation be developed to prevent nanoparticle exposure becoming the 'new asbestos'. He noted that if regulators introduced "controls that are too lax, significant health effects [will] harm many people. The history of asbestos should warn all of society of the human and financial costs of this possibility"^{ix}.

Our experience with asbestos has given Australia first hand knowledge of the huge human and financial cost of failure to take action following early warning signs of harm to health associated with 'wonder materials'. In Australia, between 1987 and 2010, asbestos exposure is predicted to result in 16,000 deaths from mesothelioma and 40,000 deaths from lung cancer^x. Asbestos liability is by far the largest cost facing the global insurance industry today. However there are still no regulations anywhere in the world that protect the workers who manufacture and handle products

containing nanomaterials, the public who use these products, and the environmental systems in to which waste products are released.

The failure to ensure appropriate regulatory oversight of nanomaterials, and the failure to protect the public, workers and the environment from its serious new risks, presents a serious threat not only to public health but also the new industry. This is a clear example of where regulation – however burdensome for the new industry – should be seen as a prerequisite for its future successful development.

Recommendation: In line with recommendations from senior scientists, the commercial sale of products that contain manufactured nanomaterials should be halted until they are subject to new, nanotechnology-specific assessments and demonstrated to be safe. A new, comprehensive regulatory framework capable of managing the health, environment, social and broader challenges of existing and future generations of nanotechnology is required.

Friends of the Earth's proposed model for new technologies foresight, assessment and governance

Further detail to be provided by mid May as per correspondence with the Secretariat.

- i P4 National Nanotechnology Strategy Taskforce (2006). "Options for a National Nanotechnology Strategy". June 2006. Australian Government, Department of Industry, Tourism and Resources.
- ii P4, National Nanotechnology Strategy Taskforce (2006). "Options for a National Nanotechnology Strategy". June 2006. Australian Government, Department of Industry, Tourism and Resources.
- iii p191 Lux Research Inc. (2004), "Nanotechnology: The Nanotech Report 2004". New York.
- iv P85 Recommendation 10, The Royal Society and The Royal Academy of Engineering, UK (2004). Nanoscience and nanotechnologies. Available at <http://www.royalsoc.ac.uk/>
- v P86 Recommendation 12 (i), The Royal Society and The Royal Academy of Engineering, UK (2004). Nanoscience and nanotechnologies. Available at <http://www.royalsoc.ac.uk/>
- vi P85 Recommendation 5 (i), The Royal Society and The Royal Academy of Engineering, UK (2004). Nanoscience and nanotechnologies. Available at <http://www.royalsoc.ac.uk/>
- vii P85 Recommendation 4, The Royal Society and The Royal Academy of Engineering, UK (2004). Nanoscience and nanotechnologies. Available at <http://www.royalsoc.ac.uk/>
- viii Swiss Re (2004). Nanotechnology: Small matter, many unknowns. Available at <http://www.swissre.com>
- ix Health and Safety Laboratory, UK (2004). "Nanomaterials at work: a risk to health at work?" In Report of Presentations at Plenary and Workshop Sessions and Summary of Conclusions. First International Symposium on Occupational Health Implications of Nanomaterials, held by the UK Health and Safety Laboratory and the US National Institute for Occupational Safety and Health. Available at www.hsl.gov.uk
- x Kazan-Allen (2001). "Australia Bans Asbestos!" White Lung Association Alerts. Available at: <http://www.whitelung.org/wla/alerts/australia.html>