

ENVIRONMENTAL POLICY MAKING RISK ASSESSMENT RELATED TO NANOTECHNOLOGY

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Introduction

The political debate on regulating nanotechnology is just beginning.

The European Commission adopted a strategy for nanotechnologies in May 2004 and an action plan for 2005-2009 in June 2005, emphasizing the need for a "*safe, integrated and responsible approach to the development of nanotechnologies and nanosciences*" and the importance of the "*assessment of potential risks throughout the life cycle of nanotech-based products*".

Opinions

The Scientific Committee on Emerging and Newly Identified Health Risks recently adopted an opinion on "*the appropriateness of existing methodologies to assess the potential risks of nanotechnologies*". The report states that "*in particular, the existing toxicological and ecotoxicological methods may not be sufficient to address all of the issues arising with nanoparticles*". The conventional toxicity and ecotoxicity tests may require modification regarding hazards evaluation and the detection of nanoparticle distribution in the human body and in the environment.

Nanoforum, a pan-European nanotechnology network funded by the EU, has published a report on the current state of art of the European and global debate on benefits, risks, ethical, legal and social aspects of nanotechnology. Its report also highlights the importance of realistically taking into account the long-term visions and scenarios of proponents and opponents of nanotech, including science fiction writers, as they influence public opinion.

In the Communication "*Towards a European Strategy for Nanotechnology*", which it adopted on 12 May 2004, the Commission spells out a series of recommendations and initiatives on how to boost European nanotechnology R&D. Its main considerations are the consolidation of public and private research efforts as well as improved technology transfer to turn research findings into commercially viable products. It also addresses the need to identify and respond to concerns about safety, health and environmental risks related to nanotechnologies.

The Commission proposes the following key actions: boosting R&D investment and infrastructure; improving training for research personnel; enhancing technology transfer in Europe and increasing funding for this; increasing international co-operation towards a responsible approach to nanotechnology R&D globally.

On 7 June 2005, the Commission adopted an action plan for 2005-2009 defining actions for the "*immediate implementation of a safe, integrated and responsible strategy for Nanosciences and Nanotechnologies (N&N)*". The actions include: fostering industrial exploitation of R&D on N&N by bringing together stakeholders to discuss best practices for commercialisation, the societal, political and psychological barriers to entrepreneurship in Europe and licence arrangements between industry and R&D organisations; working on common standards; boosting funding for nanotechnology in the Seventh Framework Programme (FP7), including specific support for research into the impact on human health and the environment; specific support to research in nanoelectronics under the Information and Communication Technology (ICT) priority of

FP7; fostering technology platforms to implement a strategic R&D agenda for N&N; developing an N&N research infrastructure and poles of excellence; establishing a true dialogue with citizens and informing all stakeholders about progress and expected benefits of N&N; ensuring that ethical principles are respected and citizens' concerns and expectations taken into account; integrating risk assessment related to human health, the environment, consumers and workers at all stages of the life cycle of the technology; a European Award for nanotechnology to highlight best practice [1].

NanoMedicine technology platform was launched in September 2005. Its aim is to develop a Strategic Research Agenda for nanomedicine in Europe.

Other international points

The Canadian environmental Action Group on Erosion, Technology and Concentration (ETC) published report on nanotechnologies and their potential impact on society entitled "The Big Down". Reviewing the impact, risks and main actors in the area of nanotechnology and outlining policy recommendations, the ETC is a firm believer in the dangers of the "grey goo scenario" and warns that "in the future, mass production of unique nanomaterials and self-replicating nano-machinery pose incalculable risks. Atomtech [nanotechnology] could also mean the creation and combination of new elements and the amplification of weapons of mass destruction".

The UK Royal Society and the Royal Academy of Engineering published a report "Nanotechnology Views of Scientists and Engineers" as part of a study into the benefits and problems of nanotechnology and nanoscience. While the experts believe that nanotechnology can be used to benefit human health and the environment, a strong focus of the report is on the question of health risks and environmental dangers of nanotubes and other nanoparticles. The scientists therefore call for further studies to be carried out to assess these dangers. The report also concludes that the science fiction scenario of self-replicating

"nanorobots" transforming the world into "grey goo" is likely to be physically impossible.

In 2000, the Commission published a communication on the so-called 'precautionary principle', saying that this covered "cases where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU" [2].

The White Paper on European Governance points out that recent food scares such as the one generated by mad cow disease have undermined public confidence in risk-based policy-making. Furthermore, it recognizes that this problem is worsened by the "opacity of the Union's system of expert committees or the lack of information about how they work", making it unclear who is taken the decisions, policy-makers or experts. In December 2008, the Commission published a Communication on principles and guidelines on the collection and use of expertise, which stipulates that all gathering of expert advice should be underpinned by quality, openness and effectiveness.

Conclusion

The scientific community and industry often argue in favor of a strictly risk-based policy making, saying that risk analysis is the only "objective scientific basis", which can lead to more "rational" decisions. According to the proponents of this approach, problems and limits of risk analysis can be overcome through thorough data collection and research, as well as strict guidelines for the consistent conduct and presentation of the results.

References

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2. Avouris, P., Bhushan, B., Bimberg, D., Klitzing, K. von, Sakaki, H., Wiesendanger, R., NanoScience and Technology (2007).