

## Hydrogen and Governance Dunsmuir Lodge, 16-18 October 2005

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In contemporary advanced industrial societies, an honest engagement of the public in dialogues about identifying the risks and benefits associated with new technologies, and about how to manage the risks in an acceptable fashion, often never occurs at all. Or, when it does, in some truncated fashion, such engagement occurs toward the very end of the long chain of development through various stages –

- *Science*: starting with basic science, then through the stages of applied science;
- *Technology*: “proof of concept” for potential commercial development, patenting, testing of prototypes and market potential for meeting profit targets, issues of scale-up to commercial production;
- *Regulation*: interaction with government regulators (if required);
- *Marketing*: winning customer acceptance, gaining market share objectives, obtaining government subsidies, meeting profit targets.

In North America, engagement on salient issues with the public, if it takes place at all, normally occurs just before (or during) the first phases of marketing. In other words, it occurs after companies have ready-made products to sell and after both industry and governments have already signed off on the nature of the regulatory structure which will be applied to the new technology.

During more recent times, this model is seen most clearly in the case of agricultural biotechnology (“GM foods”). In the upcoming period, the most critical test case will be that of nanotechnology applications, which are advancing rapidly, spurred on by strong support from governments, including in Canada. It remains to be seen whether nanotechnology will avoid the serious errors, made by both industry and governments in Canada and elsewhere with respect to agricultural biotechnology – errors which may be characterized as an attempt to dismiss public concerns with barely-disguised contempt and to confine public engagement to the most trivial of exercises.

Going back in time, the civilian nuclear industry went through these stages at a time when public engagement requirements did not exist. Although this may appear to be a "golden age" of untroubled bliss for the technology developers, sometimes the bill for strategic errors only comes due decades later. In North America, the market for civilian nuclear power began to collapse in the 1980s, due to public concerns about risks (and, to a lesser extent, about risk-cost-benefit tradeoffs). Twenty years later, as some jurisdictions face critical questions about future electrical energy supply, politicians try desperately to find some way of avoiding a full public debate on nuclear power. The NIMTOF strategy is strongly preferred, both for issues of new nuclear technologies and for the seemingly endless consideration of an acceptable solution for long-term disposal of high-level nuclear waste.

Going back further in time, to the late nineteenth century, to the time when the twin foundations of the modern industrial economy (chemicals and oil) were erected, no forward-looking impact assessments or adequate regulatory structures entered the imagination. Thus in retrospect it could be said, for example, if one accepts the scientific consensus on climate forcing, which includes a role for anthropogenic GHG emissions, that from the outset the market price of every barrel of oil should have carried an appropriate, internalized environment cost for GHG mitigation. Now we have to try to catch up. But, realistically, considering that global emissions reductions on the order of +60% from current levels are needed in order to curtail climate forcing, and that emissions will continue to rise strongly into the future, we may find that climate change is one enormous set of risks which actually cannot be managed – no matter what the consequences are thought to be. Even if the very future of modern civilization is at stake, which it may be.

Which brings me to hydrogen. My only comment is that, where any novel industrial technology of significant scope and expected impact is contemplated, current public expectations are that the risk-cost-benefit calculus should be put on the table for debate sooner, rather than later. This is especially true for the dimensions of risk characterization and risk management. This discussion must be move up the chain of development, and it must begin early in the stage called "technology" in the list above. The nuclear energy example shows clearly that initial successes will be short-lived if the public turns against the technology, no matter how attractive the technical calculus of risk and benefit numbers are.

