

[DRAFT: PLEASE DO NOT CITE WITHOUT FIRST CONSULTING AUTHOR]

**Hydrogen Workshop, University of Victoria, Dunsmuir Lodge, Oct.15th-18<sup>th</sup>, 2005**

**Some Preliminary Issues for Thinking About Risk and Hydrogen: the relations  
between ‘science’ and ‘policy’**

**Background Discussion Paper,**

**Brian Wynne**

**Lancaster University**

**Some Preliminary Preliminaries**

I have managed to read a little, but far from enough, on prospective hydrogen energy futures, before doing this paper. Rod asked for some thoughts about what should be considered in thinking about ‘risk’ and hydrogen futures, drawing on previous learning about risk and public issues over new technologies. So it is pitched at that more general, ‘one step-before..’ sort of level.

The main attraction of hydrogen, in addition to its environmental positives, seems to be its mobility, hence value for replacing hydrocarbons, in transportation particularly. However as with hydrocarbons, I am assuming that if it takes off at all, hydrogen will be used more broadly and diversely, way beyond even that pervasive sector. Given that we are talking ‘systems’ here rather than specific isolated technologies, I also assume that the learning about risk, technology, society and policy upon which I am trying to draw should relate more to that overall level, even if in practice it doesn’t make too much sense to pretend to decide and design *directly* at this more ‘totalistic’ societal level. One of the key arts of good policy seems to be just this capacity to address and take care of longer-term issues and responsibilities in a sensitive way while appearing only to deal with immediate, ostensibly ‘calculable’ dimensions. This implicit switch of level is pervasive, between specific hardwares and functional technologies, and the more societal, or systems; and it is something to bear in mind throughout the following, as I don’t keep harking back to it, even if it has more direct practical implications which here and there I am able to bring in.

**1. Where to Start (I)? – Policy, Science and ‘Institutional Self-Awareness’**

It is tempting to think that we have a tabula rasa for this kind of policy-analytic exercise; but of course this is true neither for hardware aspects, nor for socio-cultural and attitudinal aspects. In reality every ‘new’ development, social or technical or both, is always

channelled, constrained and maybe sometimes assisted by what are existing entrenchments and inertias of one kind or another. These need to be understood because if they are allowed to become just part of the taken for granted 'natural' institutional landscape, they

able to generate awareness of taken-for-granted assumptions which have shaped thinking (thus commitments, and expectations) without being explicit or deliberate. Reality as it pans out is always and often quite radically different from our best rational anticipations, and scenarios supposedly developed and used as different from predictions, tend inevitably to end up playing a predictive role in practice even with the best will in the world. Finding ways of confronting such endemically conservative intellectual and practical processes is a challenge now being recognised in policy and policy analysis processes, and for the scientific elements of these at least as much as the more obviously 'values' elements. Thus for example, forms of cross-disciplinary exchange which have these exposures, confrontations and non-defensive negotiations of such assumptions embodied in them are an essential, maybe especially for the more ambitious sort of system assessment-design problem considered here.

We should also be modest here. After all, this holy grail of 'institutional self-awareness', or 'institutional reflexivity', is almost a contradiction-in-terms, strictly-speaking. Institutions almost by definition are about routinisation, as part of the essential economy of social life; this does not encourage readiness to expose, question and debate what has been taken-for-granted in such routines which constitute institutional roles, processes and functions. Trade-offs present themselves here, and these are usually those which are not objects of self-consciously rational, explicit policy trade-off procedures and methods, precisely because they were not usually explicit, but were buried and unaware.

## **2. Where to Start (II)? - Framing**

We can perhaps see the importance of this issue by going back to the early days of nuclear and energy risk assessment in the 1970s. A Canadian expert, Herbert Inhaber (~1978?), performed one of the first ever 'life-cycle assessments' of nuclear risks, and more ambitiously still, did this comparatively with 'competing' energy systems like renewables, coal, oil etc.. His method was in principle path-breakingly sensible in that it tried to compare risks of options which were seen as alternatives for public investment, and to do this not just for the immediate energy-production plants, but for the whole life-cycle (LCA; life-cycle assessment), thus for the full range of materials and other inputs and outputs which each option involved, eg for nuclear, uranium mining, and long-term radwaste management; and for wind, the risk-costs of th

wholistic, systems-wide, then-new LCA-based, and (2) comparative assessment approach, was boldly original and in principle rational. What the ensuing conflict highlighted was that, the more comprehensive any such assessment tries to become, the more it will come to be crucially framed by assumptions about future conditions which are never precise, and which cannot pretend to be predictive, but must be treated as themselves objects of policy analysis – about technical and social feasibility; and of policy debate – about acceptability as well as feasibility.

The more comprehensive such life-cycle approaches try to become, the more they inevitably involve contingencies which fundamentally change the epistemic status of the

central part of its formal proposals for rational public policy making around new technologies, regardless of putative concerns over risks from any specific innovation. In the case of GMOs in the EU again for example, this would have meant a structured debate about the priorities for European agriculture, and about what would be acceptable as a supposed baseline of 'normal' agriculture and its environmental/social implications, against which new agricultural technologies could then be assessed. What appear on 'revealed preference' assumptions to be socially acceptable baselines of risk or benefit because they are currently part of normal practices, have been recognised to be very dubious and misleading as indicators of real public attitudes and values.

Thus how we have come to frame the issues we think we are dealing with, and what we assume publics are and should be concerned with (thus also, see below, how we think about publics and 'users') as the public issues, is a crucial matter for professional self-reflection



insulation, efficient available white goods etc. rather than on new production, whatever the source. I recall having my ear bent regularly by nuclear friends, that this would never work, because people could not be trusted to make 'the right decisions' in such socially distributed and diffuse fashion as end-use measures required, whereas new production is more centralised, usually or feasibly high-tech., even if eg coal, and more under technocratic centralised control, 'thus more reliable'. So there is a social trust, and technical fix issue built into this macro-policy question. It has never been posed and debated directly as such, and perhaps it is time that it was? It is just as germane to hydrogen it seems, as it is to energy more generally, because the same questions about demand-trends and demand-management policies, if so which, still prevail against whatever production options we might consider. It is almost as if this question has been silently answered without ever even being posed, in favour of an institutional policy and expert commitment to technical fix(es) whichever particular one(s) and mistrust of wider publics, thus in favour of endless and more-or-less indiscriminate production-expansion, against any serious attempts to manage use and demand.

#### **4. Public Reactions and Roles**

Volumes could be – have been! - written on this aspect, so here I will be brutally brief and selective, just highlighting two or three issues which are of quite general significance whatever scenarios and alternative configurations or conditions may be under consideration. The most important general point at this juncture I think, is that understanding public responses and attitudes requires us to be more ready to examine critically what it is that we think publics are responding to – is it risks for example, benefits and risks together, or maybe institutional scientific-policy behaviours and claims, including how they may have handled what can be taken as precedent-cases in related fields. What counts for publics as 'related' and meaningful here of course is not necessarily what we would naturally take as 'related' – but this is a matter for negotiation rather than presumption and dictation, and it needs to be understood better than we have done so far, social scientists included. Thus how publics frame the issues is different from how experts typically frame their meaning, and we need to develop sensitive and unassuming antennae on these dimensions:

- ∅ It has been noted and analysed by some social scientists of technology (Woolgar, Grint and Woolgar, Suchman) that systems designers often necessarily make assumptions about how users will organise and use their technology being designed. Crucially, as these authors pointed out also, these assumptions affect the hardware





∅ Finally, an aspect which relates to the foregoing point is the treatment of uncertainty by scientists and analysts of risk and policy questions. Publics are often assumed to be fearful of risk and uncertainty, and that is supposed to be why they respond conservatively to many new initiatives. The institutionalised policy and scientific language of risk and risk assessment as reassurance of public concerns, systematically deletes any recognition of unpredicted effects, because risk assessment by definition can only deal with known possible effects. Yet much social research on public attitudes shows that the main concern of publics is with unpredicted effects, beyond risk assessment. Thus as I have noted before, the public scientific language used with good intention as an attempted reassurance of those concerns, actually ends up exacerbating them, since in effect (which is different from intention) it denies that there will be any unpre-