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Energy/Minerals

The Icelandic Strategy

Iceland, a massive oil-user, is looking to an alternative hydrogen energy strategy. This means a massive upscaling from its present use in the fertilizer industry, plus augmentation by geothermal, to supply local fuel needs with some for export. The fuel cell revolution of the late 90s led to formation of an Icelandic joint stock company involving Daimler Chrysler (pioneer of fuel cell cars), Shell (pioneer in renewable energies) and NorskHydro (experienced hydrogen systems conglomerate).

Their five-phase scenario could lead to a fully hydrogenised economy within 30 years. Phase one is demonstration fuel-cell powered public transport buses, progressing to cover the entire bus system as infrastructure develops. Private car conversion is the third stage. Problems arise with the infrastructure since on board gas storage is too expensive for the initial stages, and liquid methanol, containing hydrogen which needs to be reformed while in use, is likely to be used. Methanol is currently also preferred for the final two phases, as the fishing fleet converts to fuel cells.

There are major problems with methanol which is very toxic and gives lower environmental benefits. But this "onboard reformer option" is favoured since car companies are reluctant to mass-produce cars which cannot be easily refuelled in diverse localities. The alternative option, "direct hydrogen", is far more efficient over the longer term, produces zero emissions, and can be easily produced. This would facilitate development of a global fuel and infrastructure once more investment in R&D is committed. The US is able to consider another option, direct reformation from natural gas at hydrogen refuelling stops.

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While research goes into perfecting the direct hydrogen option, there is a real risk that the methanol option could lock out the better system since change would be too costly for many. The Icelandic initiative of public and private sector partnerships could be applied worldwide. (*Worldwatch*, Nov/Dec 2000.)

M. W. Jensen, M. Ross detail developments in the auto industry on alternative fuel vehicles (AFV) including the hydrogen fuel cell model (FCV). Three major technical barriers are: integrating small, lightweight, inexpensive, efficient fuel cell engines; designing hydrogen storage tanks for sufficient onboard capacity; and developing appropriate hydrogen refuelling infrastructure. The methanol reformer approach with its mixture of near-term advantages and long-term drawbacks is unlikely to encourage a nationwide reformer infrastructure. The reformer process using natural gas is currently available and very efficient. Coal and oil can also be reformed but results in higher carbon emissions. A centralised reforming system faces the problem of disposal of the carbon either by injection into deep earth systems or into the deep oceans. Eventually renewables such as solar, wind and biomass could compete with coal- and oil-based hydrogen to meet growing global energy needs, encouraging the longer over shorter term advantages in choice. Currently the chicken-and-egg infrastructure dilemma is huge. (*Environment*, Sept 2000.)

Christchurch is trialing electric hybrid buses, using a turbine combined with a new, super-efficient battery to provide electric power from LPG. Export potential to Asian cities could enable the buses to compete with diesel. (*Export News*, 19 Feb p1.)

Hybrid Power, *Time* (US), 11 Dec pp 94-95, describes two brands of piston/electric cars coming on stream, forerunners of models predicted to comprise 20% of the US market in a decade.

"Far-out" V. Smil, *Technological Forecasting and Social Change*, Nov 2000, warns that long-range energy forecasting has missed every important shift of the past two generations, including OPEC's rise and wane, the oversold promise of nuclear power, and that of renewables, while underestimating the value of conservation. Some advice: there is always room for significant errors; the inbuilt uncertainties, plus small errors in quantities or quality, can aggravate the interactions with socio-economic and environmental areas beyond the scope of any increase in complexity of the models.

"Micropower: The Next Big Era", S. Dunn, *Worldwatch*, 2000. The second electrical century could reverse reliance on large, centralised power

systems. Small capacity solar cells, microturbines, fuel cells and similar devices are becoming commercial. Competitive markets encourage economies of production with more smaller units and much lower transmission demand. Environmental concerns accentuate the trends. Micropower may have its greatest impact in the developing world. It is also a disruptive technology ignored by the conventional mainstream, with potential to grow rapidly. See also *The Economist*, 5 Aug. 2000, pp77-79.

"Energy, Survey", *The Economist*, Feb. This is a time of dramatic change, as the energy world is reshaping. Power markets are liberalising, the oil giants are greening and disruptive technologies emerging. The energy businesses are rethinking their core competencies, their competitors and their customers, while billions of people without efficient energy supply stand to gain access. Researchers report that the promise of green plastics replacing petrochemical ones is now less likely. Biodegradability adds to greenhouse emissions, while processing uses lots of fuel. *Scientific American*, August, 2000

Not So Promising

The international diamond industry has been deeply embarrassed by a recent UN report exposing the conflict diamond trade, which involves many African governments and armed rebels. De Beers, under heavy pressure from a NGO pressure group Global Witness, is to impose tighter-self regulation. Stricter controls in trading centres such as Antwerp will have limited effect until the demand side is contained, namely the illicit trade in small arms. *Financial Times*, July 12, 2000, p10.

G. Glasby, *Science*, 28 July, 2000, reviews lessons learnt from deep-sea mining. False economic forecasts and poorly designed laws based on these have wasted much investment in deep-sea mining. Recent attention is focusing on submarine hydrothermal deposits at convergent plate margins, with best prospects for those with high gold and base metal content located close to land, in depths of less than 2000m.

Economics/Business

Innovative Disruptions and Development Ideas

Harvard business Professor C. Christensen ascribes the reversal of Japanese economic momentum and parallel US acceleration, to the impact of "disruptive technologies". These create major growth in the industries where they occur by allowing less-skilled, less-affluent people to

perform tasks previously the domain of expensive specialists in centralised locations. Consumers get cheaper, more convenient products.

Since the market performance trajectory of technological innovation frequently outstrips customer's abilities to utilise improvement, companies serving current customers' needs overshoot what those customers want next. Disruptive technologies enter at the market level where there are niches for cheaper ones, even if initially they perform poorly. The ultimate size of the market for the new technology may take over a decade to develop, eg the PC, causing planners to ignore it. Sony advanced on the intuition of founder Morita, not its market researchers. Globalisation's real market lies with the billions in developing countries who are becoming first-time consumers for products like the electric vehicle, in the enormous markets of middle income E and S.E. Asia. These nations have skilled, cheap technologists and investment capital for riskier innovations. *Foreign Affairs*, Mar/ April.

Futures researcher A. Hammond, *Foreign Affairs*, Mar/April, raises hopes and concerns about the poorest four billion people who are denied access to both basic needs and simpler transforming technologies. There are doubts that technology can close the global development gap, but potential exists for bold new ventures to jump start the pace, if there is the will for action. A new development model is needed, neither conventional free-market, nor traditional top-down development, but a bottom-up process which makes credit, communications, information, energy resources and other self-help tools directly available in poor regions, facilitating self-directed development. Business can provide new services for poor but paying customers. The argument over the priority of basic needs or IT technologies is resolvable, the latter can assist the former. One example of many worldwide is Grameen Bank in Bangladesh which helps fund entrepreneur-run village telephones, which have social and economic benefits. IT can facilitate better justice and regulatory systems, supporting civil society. While business and government can help, for such global development global contributions, eg tax on trade flows, should be made.

Poverty, Social Exclusion and Microfinance in Britain, B. Rogaly et al, Oxfam/New Economics Foundation 1999. A non-technical account of the dimensions of poverty and social exclusion in UK, the constructive role of microfinance for this, plus the international experience and relevance of microfinance. Such an approach should be integrated with wider economic and social improvements.

Australian social work academic K. Serr assesses efforts to shape a theory and practice of alternative economics, built around human basic needs, self-development and care for the environment. This is an old strand in economics, now reviving with the global prevalence of poverty and widening inequality. To become any challenge to the conventional economy, it has two options: to try to influence or take control of national policies, or to build mini-societies which slowly influence national policy. Further maturing both in theory and practice is needed. *Just Policy* (Australia), March.

J. Robertson foresees these pressures reducing sources of public revenue: highly mobile capital and skilled labour; resistance to taxation to support the "economically inactive"; Internet trading; and pressure to eliminate tax havens. Radical restructuring of the tax system should focus on immobile resources which are in common use: site value of land, energy; waste depositing in the environment; spaces used for transport; water; the radio spectrum; genetic resources, and the value arising from issuing new money. Western and Japanese banks are making great profits from the creation of interest-bearing, profit making loans. Central, national monetary authorities should decide on, and create, any increase in the money supply and outlaw other attempts to do this. Global taxes should also be levied on use made by each nation of the "global commons": resources, pollution, flight lanes, radio spectrum etc. *Creating New Money: a Monetary Reform for the Information Age*, J. Robertson, J. Huber, New Economics Foundation, 2000. See also *Resurgence*, Jan/Feb.

The World Bank's World Development Indicators 2001 showed Cuba topping almost all other poor countries in health and education statistics, despite continuing US trade embargoes. W. B. President J. Wolfenson urged other nations to learn from Cuba, although its economic policies contradict the neo-liberal orthodoxy for development. J. Lobe reporting in *Inter Press Service Finance*, Washington April 30, by private e.mail.

Just Capital: The Liberal Economy, A. Turner, Macmillan emphasises that there is no one model for economic success. Globalisation has not fundamentally changed the scope for political and social choice. Countries can deploy a variety of tax and regulatory systems and thrive economically.

Threats and Solutions

US Coast Guard Commander S. E. Flynn, *Foreign Affairs*, Nov-Dec 2000, warns that efforts to strengthen border security and control will become counterproductive as international trade expands. A paradigm

shift requires that: countries must tighten security within the transport and logistics systems; they must urge international companies to develop transparent tracking systems for commercial flows; border agencies need better ways to gather intelligence and manage data.

R. I. Friedman, *Red Mafiya: How the Russian Mob Has Invaded America*, Little, Brown, 2000. This is the fastest growing, global criminal superpower, infiltrating banks, brokerage firms and operating in over 50 nations, particularly Israel.

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