

## What price a carbon tax?

SIR—The proposition of a “carbon tax on fuels proportional to the carbon dioxide they emit”, put forward by former Environment Minister Nicholas Ridley, is echoed in the Department of Environment’s Pearce report as a means of putting a price on environmental benefits and losses<sup>1</sup>. But can a carbon tax be a realistic and cost-effective way of combating greenhouse global warming?

Methane has 30 times the greenhouse potential of CO<sub>2</sub>, molecule for molecule. And leakages of methane associated with natural gas production and distribution are significant, being estimated at 3–6 per cent in the United States (D. Abrahamson, unpublished data) and 3–10 per cent (by me) for the British North Sea gas. This means that, despite the lower emission of CO<sub>2</sub> per unit of heat in gas combustion, the gross contribution of gas for the greenhouse effect is no better than that of coal or oil.

Second, the major chlorofluorocarbon gases (CFC-10 and CFC-11) have some 10,000 times the greenhouse potential of CO<sub>2</sub>. A tax of say 5 pence per litre on petrol would scale to £500 per litre on CFCs. Could the economists stomach such a level of tax, even if there were rebates for essential medical uses?

Yet even that tax would be too low to produce substantial cuts in fuel consumption, while the differential tax between gas and coal, amounting to only 2 pence of the 5 pence, would not induce the fuel switching that Pearce *et al.*<sup>1</sup> want. The Association for Conservation of Energy<sup>3</sup> “believes current energy prices would have to double if there is to be any real impact on consumer behaviour”.

But supposing that the tax were 5 pence per litre of oil equivalent; its yield in Britain would be £45,000 million a year in Britain if it were levied on coal, gas and oil in proportion to the CO<sub>2</sub> emission (600 Mt per yr<sup>2</sup>). That is a significant sum for the British Treasury. What would happen if only 10 per cent of it were invested in energy efficiency and conservation measures?

Dr Tim Jackson’s evidence to the Hinkley Point “C” PWR Inquiry<sup>4</sup> gives figures roughly in the range £5–30 per tonne CO<sub>2</sub> saved for various current technologies, including combined heat-and-power, renewable resources, domestic and office heat insulation, energy-efficient lighting and so on, taking into account their various lifetimes and discount rates of 8–10 per cent per yr. At say 15 per cent, the £4,500 million would save 300 Mt or half our total CO<sub>2</sub> emissions. In comparison, the £45,000 million tax increase might directly effect 60 Mt savings.

While the Treasury would no doubt welcome a carbon tax windfall, it is clear

that direct investment in energy-saving technologies is far more effective (50 times, on my figures) than taxation.

In practice, in a market economy, the way forward is through tax allowances and energy-efficiency programmes (the current puny level of under £20 million a year is even being cut back under present policy), as the House of Commons’ Energy Committee advocated<sup>4</sup>. Whether such fiscal and promotional measures are financed by a normal carbon tax at say 0.5 pence per litre oil equivalent (plus £50 per litre on CFCs) or by general taxation is immaterial.

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1. Pearce, D. *et al.* *The Implications of Sustainable Development for Resource Accounting, Project Appraisal and Integrated Environmental Policy*, London Environmental Centre, 1989.
2. *World Climate Change Report No. 0, 24* (Bureau of National Affairs Inc., Washington DC, 1989).
3. *Energy Policy Implications of the Greenhouse Effect Vol. 1* (Energy Committee 6th Report, House of Commons, 1989).
4. Jackson, T. *FoE-10*, Hinkley Inquiry secretariat, Cannington, Somerset, June 1989.

## What happened?

SIR—Members of the growing band of biomedical scientists who are becoming disenchanted with the current science funding situation should recall the words of Dr F. W. Twort: “I regret that financial considerations have prevented my carrying these researches to a definite conclusion, but I have indicated the lines along which others more fortunately situated can proceed.” (Twort, F. W. ‘An investigation in the nature of ultra-microscopic viruses’, *Lancet* **ii**: 1241–1243; 1915).

Twort is one of the people after whom was named the Twort–d’Herelle phenomenon which became known as bacteriophage, the study of which helped greatly to spawn molecular biology; the burgeoning study of this subject is one reason there are not enough funds to go around.

Perhaps some reader can tell us what happened to Twort. Was he assigned a bigger teaching load? Did he become an administrator? Did he later drive a cab in London?

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## Carbon dating

SIR—With respect to your News item on radiocarbon laboratories (*Nature* **341**, 267; 1989), we wish to correct some factual inaccuracies and to emphasize that the recent carbon-14 workshop marked a significant step forward by the international

dating community towards improving and refining an already high degree of analytical care, accuracy and precision.

The meeting in East Kilbride reviewed the results of an international (not only “British”) study in which around 40 laboratories worldwide analysed a suite of samples of varying type and age. Rather than finding “a disturbing pattern of errors”, the comparison found evidence of currently unexplained variation in the results, which of course explains why the carbon-14 community is undertaking a continuing programme to ensure the quality of its results. In fact, given that a carbon-14 dating analysis requires assay of 1 carbon-14 atom per 10<sup>12</sup> to 10<sup>14</sup> carbon atoms, the level of agreement between laboratories is remarkable. Further to refine the accuracy and precision of dating, however, the meeting agreed a programme of improvements, including (1) the distribution of new reference materials by the International Atomic Energy Agency, (2) more regular in-house analysis of reference materials and (3) continued ‘blind’ testing programmes organized by ourselves.

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## Hidden increases

SIR—*Nature* has quite often looked at the costs of scientific periodicals (for example **341**, 349; 1989), but I am not sure it has considered the dubious practice publishers sometimes have of adding to periodicals new sections that subscribers must take whether they want them or not. Publicity often tries to make us think we are getting something extra for nothing when in fact there are usually above-average price increases that are not mentioned. For example, *Tetrahedron* is to increase in price by £400 (30 per cent) to accommodate *Tetrahedron: Asymmetry*, and *Journal of Materials Science* will spawn new periodicals on materials in electronics and medicine at an extra cost of £200 (again nearly 30 per cent). My budget usually declines in real terms so that, as in many libraries, coping with even average price rises often requires the cancellation of some titles to pay for the remainder. Huge increases like these, often at short notice, do not help in budgetary planning or endear periodical publishers to librarians.

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