

ON THE RECORD

“There’s no way that I’m ever going to be able to serve liquid nitrogen margaritas.”

Bartender Eben Klemm recognizes the limits of ‘molecular mixology’, the use of science to create innovative cocktail experiences.

“I feel that I have been in a war and under siege for six years.”

Christopher Hall reacts to the jailing of four UK animal-rights campaigners who terrorized his family’s farm, which until January bred guinea pigs for research.

Source: *New York Times*, BBC

SCORECARD

**Flu fighters**

A study of two old, generic drugs contradicts previous reports that they don’t work against the deadly H5N1 bird-flu virus, boosting hopes that amantadine and rimantadine might help control a pandemic.

**Penguins**

Researchers are hunting for the source of a mysterious oil spill that has killed 100 Magellan penguins off the southern coast of Argentina.

NUMBER CRUNCH

Cynics often suggest that clinical trials funded by drug companies have a knack of supporting new treatments over old. But there may be more to this than gut feeling, reveals a survey looking at trials that tested new cardiovascular therapies against established treatments.

49% of 104 trials sponsored by not-for-profit entities came to the conclusion that the newer treatments were better.

56.5% of 62 trials sponsored by partnerships between for-profit and non-profit entities favoured new treatments.

67.2% of 137 trials sponsored by for-profit funders found evidence supporting the use of the new treatment.

Source: Ridker, P. M. & Torres, J. *J. Am. Med. Assoc.* **295**, 2270–2274 (2006).

PHOTOFUSION PICTURE LIBRARY/ALAMY



Panel beaters: could low-carbon energy be surprisingly affordable?

Economists claim carbon cuts won't break the world's bank

Transforming the world’s energy industry to stop the flood of greenhouse gases into the atmosphere might actually be quite cheap.

Figures of tens of trillions of dollars are often cited, and used to question whether measures such as the Kyoto Protocol, which attempts to limit carbon emissions, are too expensive. But according to a suite of economic models released late last month, the costs of stabilizing carbon dioxide levels could be tiny — equivalent to setting back the growth of global GDP (gross domestic product) by less than 1% over 100 years; global GDP generally grows 2–3% each year. In some cases, the right policies for limiting carbon emissions could even create a surprising win-win situation, leading to the stabilization of greenhouse gases and an increase in global wealth.

It is a controversial conclusion with which not everyone agrees, but which the modellers say should be food for thought for policy-makers. “If we prepare properly and acknowledge that carbon will be constrained, it will be relatively cheap,” says Michael Grubb, a climate-policy expert at Imperial College

London. “But only if we do the right things.”

The models simulate a complex issue in economics: how government climate policies such as research investment or greenhouse-gas regulation can bring about technological development. It is obvious that technologies evolve, but the processes involved have been factored into economic models only since the late 1990s, in part because it is difficult to untangle how advances occur. The Innovation Modelling Comparison Project, published in a special issue of *The Energy Journal*, is a two-year

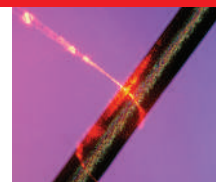
effort involving eleven different models that represent the latest thinking on the problem.

The results are striking. Nine of the models predict that stabilizing carbon dioxide levels at

450 parts per million, widely seen as the most ambitious target worth discussing, would set back global GDP by less than 0.5% or so by 2100 (the other two produced figures of 2.1% and 6.2%). In each scenario, the regulation of greenhouse-gas emissions persuades the private sector to shift investment into low-carbon technologies, which then become competitive with traditional energy sources.

In some cases, this shift in investment

“Reducing greenhouse gases will be relatively cheap — but only if we do the right things.”

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stimulates growth and actually boosts overall wealth. At least, that's the conclusion of two of the models — one developed at the University of Cambridge, UK, and the other at the Fondazione Eni Enrico Mattei, a centre for sustainable-development research in Italy. These models suggest that stabilization policies would give an added boost to global GDP of up to 1.7% over 100 years. They assume such climate policies will bring about side benefits, such as increased investment in new technologies.

Ottmar Edenhofer, an economist at the Potsdam Institute for Climate Impact Research in Germany who edited the issue along with Grubb and others, says the new estimates of lost global GDP are significantly lower than previous ones, which put the range at 3–15%. They suggest the price will be a lot lower, agrees Terry Barker, an economist who helped developed the Cambridge model, especially as costs will be spread over 100 years.

The models are likely to influence the next report from the Intergovernmental Panel on Climate Change, due for publication next year. The authors hope the results will then filter through to governments. They say the cheapest stabilization route can only be achieved if industries are given a strong signal that carbon emissions will continue to be restricted — and that means the United States must join a future version of the Kyoto Protocol. Europe also needs to do more, say the authors, particularly in terms of investment in energy technologies, where it lags behind the United States.

But some economists are wary of the results. Jae Edmonds of the Pacific Northwest National Laboratory in Richland, Washington, describes the models as a valuable “intellectual experiment”. But he questions the fact that most of the models emphasize learning-by-doing — a process by which technologies become cheaper as industry learns how to produce them more efficiently.

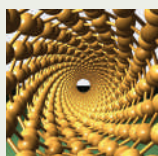
Edmonds points out, for example, that many advances in hybrid vehicles have been made possible by developments in areas outside the automotive industry. It is hard to distinguish these advances from those due to learning-by-doing or research by automotive firms. If advances are attributed exclusively to one mechanism, Edmonds warns that the benefits of the process could be exaggerated and costs underestimated: “We don't necessarily have a good handle on how important different factors are and how they interact.”

Jim Giles

TOP FIVE IN PHYSICS

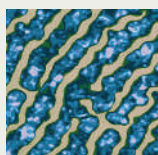
Are you working on the hottest topic in your field? Many scientists may think so, but it has been a tough assertion to prove — until now, that is. A German physicist has devised a way of answering the ‘Hot or not?’ question for his discipline. If it stands up to scrutiny, it could be used to rate topics across the sciences. In physics, the results show that hotness — measured by a parameter known as m — correlates well with the promise of future wealth... and that promise is greatest in nanotechnology.

12.85 Carbon nanotubes



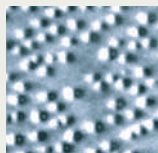
Super-strong materials and blisteringly fast electronic circuits: the potential applications of these tiny carbon tubes, discovered in 1991, are so enticing that everyone is pouring money into the field.

8.75 Nanowires



Less well studied than nanotubes, but the possible uses are similar. Nanowires could eventually prove more useful than nanotubes, because their chemistry is easier to tailor and they can be used to create nano-sized lasers.

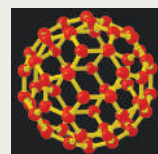
7.84 Quantum dots



Another nanotechnology with a huge range of potential applications. These tiny specks of semiconductor material, measuring as little as a few nanometres across, have already been used to create dyes for cell biologists and new kinds of

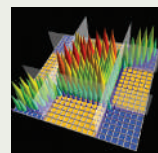
laser. Physicists hope they might one day form the basis of a quantum computer.

7.78 Fullerenes



These spheres of carbon atoms are attracting significant research interest. But the latest ranking rewards newness, so the topic may have slipped down the list because it predates nanotubes by around six years. The discovery of fullerenes earned a Nobel prize and spawned studies of numerous potential uses, such as drug delivery agents.

6.82 Giant magnetoresistance



Not a new topic, but still hot because of its economic importance. Modern hard disk drives were made possible by the discovery of giant magnetoresistant materials, which show marked falls in electrical resistance — more than around 5% — when a magnetic field is applied. Researchers are now aiming to make hard disks even more powerful.

How the topics were ranked

The ranking is an extension of a recently proposed system for rating the research output of individual scientists. The h index uses the highest number of papers a scientist has published that have each received at least that number of citations: for example, a researcher with an h of 50 has written 50 papers that have each had at least 50 citations (see *Nature* **436**, 900; 2005). The index has attracted interest from bibliometricians, but was first described only last year and has yet to be studied in depth.

Michael Banks, a PhD student at the Max

Planck Institute for Solid State Research in Stuttgart, Germany, totted up the h index for physics topics, rather than people, and then calculated the parameter m by dividing by the number of years over which the papers involved had been published (www.arxiv.org/abs/physics/0604216).

Jim Giles

Do you agree with the winners? Tell us what you think on our news blog

► blogs.nature.com/news/blog/2006/05/top_five_in_physics.html

FROM START: S. HEINZE/H. JAEGER & W. LOPES; NIST; NO CREDIT; ORNL/B. BUTLER