

specially engineered microorganisms. But although such ‘novel molecules’ could resolve a host of infrastructure issues that are unique to ethanol, they don’t amount to much more than fancy corn fuels unless the feedstock question is resolved. From a research and development perspective, the priority must remain cellulosic conversion.

Money and talent are flowing into the energy arena from both private and public sectors, but these technologies have yet to advance beyond the realm of pilot plants and press releases. The next few years will be critical as the industry tries to bridge the gap from demonstration projects to commercial-scale production. If the new biofuels fulfil their promise, they may well naturally supplant corn ethanol, in which case the mandate will have done what it is supposed to do. If not, Congress may need to step in again.

All of this should serve to remind policy-makers that the science of biofuels is still evolving, as are the tools for tracking greenhouse-gas emissions. It also underscores the need for sustained attention to energy issues (including energy efficiency, a doubling of which would enormously

amplify the benefits of biofuels). That sounds like a truism but in fact would represent a novel and important shift from the episodic, crisis-driven attention paid to this issue in decades past. Fortunately this is starting to happen. When the United States enacted a comprehensive energy law in 2005, lawmakers touted it as the first major reform in 13 years. Congress passed another major bill in December, and global-warming legislation may well be just around the corner.

Across the Atlantic, European nations are struggling with the same issues — and still have time to learn from the United States’ mistakes. Rather than promoting all biofuels, they should ensure that their policies support those second-generation technologies that will provide the biggest pay-off. The European Commission recently released a plan targeting biofuels for 10% of transportation fuels by 2020. Commission president José Manuel Barroso said the proposal would create “the most comprehensive and sustainable system anywhere” for certifying greenhouse-gas emissions from biofuels. The European Union and its member states need to ensure that they follow through. ■

## Science in retreat

Canada has been scientifically healthy.  
Not so its government.

Comparisons of nations’ scientific outputs over the years have shown that Canada’s researchers have plenty to be proud of, consistently maintaining their country’s position among the world’s top ten (see, for example, *Nature* **430**, 311–316; 2004). Alas, their government’s track record is dismal by comparison.

When the Canadian government announced earlier this year that it was closing the office of the national science adviser, few in the country’s science community were surprised. Science has long faced an uphill battle for recognition in Canada, but the slope became steeper when the Conservative government was elected in 2006.

The decision in 2004 by the then prime minister Paul Martin to appoint a scientist for independent, non-partisan advice on science and technology was a good one — in principle. Arthur Carty, the chemist who secured the position, duly relinquished his post as president of the National Research Council Canada, which he had revitalized.

But his new office was destined to fail. The budget was abysmal and the mandate was vague at best. After winning power from the Liberals, the Conservatives moved Carty’s office away from the prime minister’s offices to Industry Canada. In 2007, the government formed the 18-member Science, Technology and Innovation Council (STIC). Told that the government would no longer need a science adviser, Carty offered his resignation. From March, the STIC will provide policy advice and report on Canada’s science and technology performance. It can be expected to be markedly less independent: although it is stocked with first-class scientists and entrepreneurs, several government administrators also hold seats.

Concerns can only be enhanced by the government’s manifest disregard for science. Since prime minister Stephen Harper came to power, his government has been sceptical of the science on climate change and has backed away from Canada’s Kyoto commitment.

In January, it muzzled Environment Canada’s scientists, ordering them to route all media enquires through Ottawa to control the agency’s media message. Last week, the prime minister and members of the cabinet failed to attend a ceremony to honour the Canadian scientists who contributed to the international climate-change report that won a share of the 2007 Nobel Peace Prize.

Harper sees himself as the leader of a ‘global energy powerhouse’ and is committing Canada to a fossil-fuel economy. More than 40 companies have a stake in mining and upgrading the bitumen from the oil sands in Alberta and churning out 1.2 million barrels a day. This activity generates three times as much greenhouse gas as conventional oil drilling. Emissions from Canada’s oil and gas industry have risen by 42% since 1990.

There are deeper and more chronic problems for Canadian science. On the surface, funding for university-based research seems strong. The annual budgets for the Canadian Institutes of Health Research (CIHR) and the National Sciences and Engineering Research Council tripled and doubled, respectively, between 2000 and 2005. The government has also supported new science projects through government-created corporations such as Genome Canada and the Canada Foundation for Innovation, and has recruited and retained promising young scientists through the Canada Research Chairs programme.

But Genome Canada funds only half of the cost of a research project — scientists must seek the remaining cash from elsewhere. Last year, the CIHR was able to fund only 16% of the applications it received, and cut the budgets of successful applicants by a quarter, on average. And earlier this month, the country’s top scientists and university officials warned that they were short of funds to operate multimillion-dollar big-science projects such as the Canadian Light Source synchrotron.

What’s to be done? Canada has made good investments in its science infrastructure and its future research leaders. The present government might be dissolved after a vote of confidence next month, which could in itself lead to a change for the better. But in any circumstances, Canada’s leading scientists can be public advocates, pointing to the examples of other countries in urging the government of the day to boost their country into a position of leadership rather than reluctant follower. ■