

Domestic science

Although China is a world leader in renewable-energy technology, it is missing the chance to deploy this equipment on a suitably grand scale at home.

The United States' lengthy reign as the world's number-one energy consumer came to an end last year, according to the Paris-based International Energy Agency on 20 July. But the agency's revelation that China had finally taken the top slot swiftly drew denials from officials in Beijing.

China's protests are perhaps understandable given the huge international sensitivities over which nations have been — and will be — responsible for most carbon emissions. But even if China is not yet number one, its population of 1.3 billion and its fast-growing economy mean that it will very soon be consuming far more energy than the United States. The only real questions are by how much will that usage grow, and how much environmental damage will it do in the process?

One fact China is not disputing is that it extended its lead in sustainable energy last year, adding 37 gigawatts of renewable capacity, nearly half of the 80 gigawatts added globally in 2009. That brought its total renewable capacity to 226 gigawatts, dwarfing the 144 gigawatts of its nearest rival, the United States (see go.nature.com/vgU3mn).

China's sustainable future has solid support from the government and the industrial and financial sectors. For example, investment in China's clean-energy companies by the financial sector hit US\$33.7 billion last year — a 53% increase over 2008 and more than the \$32.3 billion invested in North and South America combined. And last month, China's National Energy Administration announced a ten-year, 5-trillion-yuan (US\$738-billion) plan that will help China realize its stated target

of 500 gigawatts of renewable-energy capacity by 2020 — nearly one-third of the nation's projected power capacity for that year.

Yet the reality of China's sustainable energy falls considerably short of the promise. For example, the installation of wind turbines continues to outstrip China's ability to hook them up to the power grid, and the sites chosen are not always where the best winds blow. The upshot is that the capacity factor, a measure of a turbine's efficiency and ultimately its profitability, is estimated to be at least 10% lower in China than in the best countries.

There are problems with solar power too. China may be the world's leading producer of photovoltaic cells, with more than 40% of the global market, but it is not even among the top five countries for installing those cells domestically. And when the Chinese government and utilities do deploy photovoltaics, they prefer big, centralized, easily managed installations, which limits a technology that is ideally suited to broad but small-scale use in places such as farms and villages. China has likewise done little to encourage the use of concentrated solar thermal energy, a low-tech but effective approach that uses lenses and mirrors to focus sunlight to run conventional steam turbines.

China's success with wind and solar manufacturing has given it good credentials in sustainable energy. But its focus on green technologies that are also immediately lucrative for export needs to give way to a more comprehensive effort to ensure that its ambitious investments in domestic green energy are as effective as possible. ■

Slow progress

US cap-and-trade legislation has fallen victim to politics. But all is not lost.

As China surges ahead with renewable energy (see above), all forward motion seems to have stalled in the US Senate. Two weeks ago, with the November elections in mind and the Republican minority in no mood to compromise, the Senate's Democratic leaders admitted that they would not have the votes this year to pass any kind of cap-and-trade system to curb carbon emissions. Instead, they opted for a scaled-back energy bill that addresses issues such as the Gulf of Mexico oil spill without doing anything to deal with global warming. As *Nature* went to press, it was unclear whether even that bill would pass. And with the midterm election almost certain to shift a substantial number of seats to the Republicans, who have so far been united in their opposition to what they call 'cap-and-tax', the prospects for more substantive climate legislation next year seem dim.

But behind the scenes, an informal group of energy-industry officials and environmentalists is quietly working on a proposal for compromise legislation that would impose a cap-and-trade regimen on just the

electric utility companies — not least because many of the utilities are keen to end years of regulatory and economic doubt. It is unlikely that the group's discussions will bear fruit this year, but lawmakers are paying attention. And it is clear that a solid majority of senators has become convinced that something needs to be done about carbon emissions.

Meanwhile, political pressure for action continues to come from states, communities, environmentalists and many businesses. And everyone on Capitol Hill knows that if Congress fails to move, President Barack Obama's administration will regulate industrial greenhouse-gas emissions using the Environmental Protection Agency's existing authority under the Clean Air Act — a process that is the first choice of no one, including Obama.

Although the political discussion has stalled at the top, there is reason to believe that momentum is gradually building from below — to the extent that at least some Republicans might be more willing to strike a deal next year. They should do so. But if the result is not the comprehensive attack on global warming that many had wished for, perhaps that is inevitable: with an issue as big and complex as climate change, there may be no way to reach consensus on a single piece of legislation that solves every problem for everybody. Instead, policy-makers both in the United States and at the international level will have to keep putting the solutions together one step at a time. ■