

THIS WEEK



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Power struggle

The UK government's decision to subsidize a nuclear power station while cutting support for renewables is short-sighted.

The English poet William Blake once wrote that “Energy is an eternal delight”. But then poets have rarely been charged with keeping the lights on. Some 200 years later, energy — and how to produce and harness it — is on track to become the defining problem of a generation.

The latest dark satanic mill on the horizon in Blake's green and pleasant land is a shiny new nuclear power station — confirmed last week after years of plotting. It will be the first built in the United Kingdom this century, and is one of the most significant nuclear deals worldwide since the meltdown at the Fukushima Daiichi nuclear power plant in Japan in 2011.

As Chinese President Xi Jinping — in the United Kingdom for a state visit — was paraded around a series of picture-book British locations, it was announced that China was taking a 33.5% stake in the Hinkley Point C nuclear plant. French power company EDF will own the remaining 66.5%.

Supported by billions of pounds of Chinese investment, the plant should provide 3.2 gigawatts of power when it fires up as planned in 2025. But never mind the output: feel the cost.

The UK government has agreed a price with the investors of at least £89.50 (US\$137) in 2012 terms for every megawatt hour of power produced by the plant. This is roughly double the current market cost, but the government claims — with a little poetic licence of its own — that it “is competitive with other large energy sources such as gas and offshore wind”.

The Conservative government also noted that this would mean abandoning the policy of several previous administrations that there should be no public subsidy for new nuclear power.

In reality, it had little choice. (The previous administrations had no problems sticking to the line, because they had no new nuclear power to subsidize.) Nuclear power plants are among the single most expensive items that governments can buy, and as Britain has allowed its home-grown nuclear expertise to dwindle, so it has lost the chance to bury the exact cost in a tangle of public expenditure. Whether the money comes directly from the public as artificially high electricity bills, or indirectly through the public purse, British politicians last week admitted that the technology simply cannot pay for itself.

In doing so, they have been criticized — there are plenty of opponents who argue, with some justification, that this nuclear deal is a poor one for Britain. But in a way, the new-found candour about the costs does at last make the debate about energy a more honest one. Most power industries, to a greater or lesser extent, need a financial leg-up.

Hinkley Point C will cost at least £18 billion. And that does at least buy a reduction in greenhouse-gas emissions compared with one carbon-heavy alternative for baseload generation: coal. But the UK government has done little to stress that point — it is hard for it to do so while systematically cutting off other low-carbon forms of electricity at the knees.

Last year, renewable energy sources supplied a record 19% of UK electricity (the global figure is around 22%), but the same government that is committed to subsidizing Hinkley Point C has set out to slash subsidies for renewables. Trade associations say that thousands of jobs could go. Businesses face collapse as sections of the solar industry deal with 87% cuts in their subsidies, and onshore wind is under threat. Perversely, ministers justified the sacrifice of these growing clean-energy sources by pointing to increasing public support for them.

“Most power industries, to a greater or lesser extent, need a financial leg-up.”

The United Kingdom is far from alone in struggling to balance short-term financial prudence with long-term environmental protection. Earlier this month, the International Energy Agency reported that renewable energy accounts for 45% of new power capacity added globally in 2014. But it warned that the rate of growth for renewables was slowing because of policy problems and uncertainties — especially in Europe and Japan.

UK energy and climate-change minister Andrea Leadsom used the ugly word “trilemma” last week to describe the energy issue facing the United Kingdom: the need to reduce carbon emissions, to maintain supplies and to keep bills down.

There is another trilemma, popular among project managers: the need for any project to be good, fast and cheap. The classic response could have been written for energy policy: ‘pick two.’ ■

Burst bubbles

Two medical-technology companies illustrate the ups and downs of innovation.

From time to time in most industries, the conventional approach is challenged by upstarts. Often backed by entrepreneurs and investors, these firms promise to use new technology to disrupt, overturn and revolutionize. Some succeed and some do not, and there are fields in which the challenge to newcomers is proving stiffer than others. One of these is health care, and events over the past week or so demonstrate both the difficulties and the opportunities.

Theranos and 23andMe are two medical-technology companies with their origins in Silicon Valley. Both have made headlines recently. Their stories may seem similar. But the differences offer an important lesson for would-be health disruptors: this industry can change, just not as quickly as entrepreneurs and their investors might hope, and only if those offering the change can also offer data to back up their claims.

Theranos in Palo Alto, California, promised to upend medicine with a device that can perform hundreds of diagnostic tests on just a few drops of blood. 23andMe, in Mountain View, California, sells genetic tests directly to consumers. Both are led by charismatic female founders: Elizabeth Holmes at Theranos and Anne Wojcicki at 23andMe. Both want to revolutionize the health-care industry and argue that patients should have access to their data. They have strong backing from Silicon Valley investors, and were hyped early on: a US\$9-billion valuation for Theranos, and lavish parties with media tycoons for 23andMe.

But both have seen their bubbles burst. On 16 October, *The Wall Street Journal* reported that the Theranos technology was not working as billed, and that the firm was using conventional machines to perform most of its tests. The company has disputed some of the article's claims. Holmes says that the company is now in a "pause period" because of scrutiny from US regulators.

23andMe's bubble burst in November 2013, when the US Food and Drug Administration (FDA) banned the inclusion of medically relevant results in the company's consumer genetic tests. On 21 October, however, 23andMe relaunched consumer genetic tests that give a limited amount of medical information, with FDA approval. The new tests offer information for 36 diseases about a customer's status as a 'carrier' of genetic glitches that could cause disease if passed down through their children.

Theranos could learn a lot from how 23andMe returned to the regulators' good graces. 23andMe has always been fairly open about its science; it publishes research papers in peer-reviewed journals and collaborates with scientists. Theranos, by contrast, has been tight-lipped about its data. Apart from detailed data for one herpesvirus test, approved by the FDA in July, the company has published only aggregate test performances on its website, not the primary data.

23andMe says that coming back from its early mistakes with

the FDA was an arduous process — requiring it to hire staff with expertise in health regulation and to compile detailed dossiers of data to prove that its tests work as advertised. The company previously had been slow to respond to the FDA's entreaties — and that tone-deafness seems to have been part of the reason that the agency eventually cracked down.

These experiences do not mean that health care cannot be disrupted. Indeed, 23andMe is the first company to gain FDA approval to sell a health-related genetic test to consumers without a doctor's order. That's a real change.

"Time and again, new health-care firms are forced to realize that it helps no one to be secretive with data."

Still, the new tests offer less information than before and at a higher price. With a few exceptions, carrier tests do not say anything about the health of the individual tested, and they are mainly for rare diseases — a far cry from the risk-prediction scores the company previously offered for cancer and Alzheimer's disease. And the new test package costs US\$199 compared with \$99 before the ban.

23andMe has also moved to make itself into a more conventional pharmaceutical firm. In March, it hired former Genentech executive Richard Scheller to lead a drug-development arm. If you can't beat them, join them.

Time and again, new health-care firms are forced to realize that it helps no one to be secretive with data. Even if it turns out that the Theranos technology does not work as well as advertised, the company would hardly be the first to find itself in that situation. Releasing more information earlier might have forced Theranos to confront shortcomings. Instead, it finds itself trying to recover from a regulatory and public-relations hole. This is not an insurmountable situation, as 23andMe knows. The challenge now is for Theranos to show us the data. ■

Ghost story

The problem of abandoned fishing gear and its effects on marine life deserve greater attention.

Here's a horror story for Halloween. Right now, in lit waters across the world, fish, crabs and other marine life are being drawn into nets and traps by the dead and decomposing bodies of their comrades. There they will stick, struggle and tangle, until they, too, become unwitting bait and continue the circle of death. Old fishing nets, you see, never die. They just drift away.

The problem of ghost fishing, as it is known, goes largely unnoticed, but some of this dead gear catches and kills more sea life than it did when it was alive and in active use. Reliable data on the scale of the problem are scarce, but some estimates suggest that the nets can remove up to 30% of the landed catch of certain fish species.

It is said that we know more about the surface of the Moon than about the bed of the sea. Perhaps we are afraid of what we will find there if we look too hard: wrecks of gill nets, entangling nets, pelagic and demersal longlines, lobster and crab pots, seine nets, trawl-net fragments and the sinister-sounding fish aggregating devices — buoys or floats, tethered to concrete blocks, around which fish tend to congregate.

Some of this fishing gear is lost and some is abandoned in rough weather. Much is simply discarded by fishers with nowhere to stow it, who are fishing where they should not be, or who just want to avoid the expense and hassle of disposing of it properly. Most of this gear sinks to the bottom. It becomes a hazard, to boats and divers. And much of it continues to catch and kill, long after it has been forgotten.

Take the coastline of Louisiana, a US state that is home to its fair share of spooky tales. Each of the 1,800 or so professional crab fishers who work there loses about 250 traps every year. Each abandoned trap, a crude wire cage, is reckoned to catch and kill a blue crab (*Callinectes sapidus*) every two weeks. That is 12 million crabs a year, or 2 million kilograms of crab meat — about US\$4-million worth — along a single stretch of coastline (J. A. Anderson and A. B. Alford *Mar. Pollut. Bull.* **79**, 261–267; 2014). Ghost crab traps snare other creatures too: spotted sea trout, diamondback terrapins and river otters among them.

Although the world organizes regular conferences to address the threat of orbiting space junk, action on the danger of ghost fishing tends to be left to volunteers. Louisiana law allows a ten-day period each year when citizens can drag derelict fishing gear from the water. In two sessions — 2012 and 2013 — volunteers recovered a total of 3,607 ghost crab traps. More than 65% of them had caught something. The actions of such volunteers are admirable but they are not enough. The fishing industry and those who profit from it must take more responsibility.

Earlier this year, Eric Gilman, a fisheries scientist at Hawaii Pacific University in Honolulu, published a survey of international efforts to track and control ghost fishing (E. Gilman *Mar. Policy* **60**, 225–239; 2015). Of the 19 global and regional bodies (from the International Whaling Commission down to the South East Atlantic Fisheries Organization) that he identified as being in a position to intervene, just 4 had an explicit mandate to monitor and reduce the problem. Almost half did not even collect data on lost gear. The 12 organizations that have introduced measures to help prevent and reduce ghost fishing have not used all the options available to them.

All ghost stories are more chilling in the dark. The problem of abandoned, lost and discarded fishing gear deserves more attention and more action. For unlike many gruesome stories you will hear this weekend, this one is true. ■

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