

If you want to find out what's really happening in the world, as distinct from the relatively trivial events in the morning papers or the evening television news, you'd do better to look for alternative sources. One, that I find useful, is *Deutschland*, the German government's quarterly journal. Snappily written, beautifully illustrated, it tells you what's happening in the EU's largest member state and also one of our economic competitors. Back in the spring, they had a special feature: *Putting new energy into climate protection*.

Germany is interesting because it takes global warming seriously – very seriously. The magazine feature starts by telling you that Angela Merkel, who started her meteoric political career as Germany's environment minister, has installed low-energy light bulbs throughout her Berlin apartment. A physicist by training, she was able to tell journalists that if everyone did the same, it would reduce CO<sub>2</sub> emissions by 6.5 million tonnes. And as with the Chancellor, so with the nation: Germany has taken up the challenge of reducing greenhouse emissions like almost no other country. At the start of the 1990s, it was one of the first countries to present a national timetable for reducing carbon dioxide. It has fully signed up to Kyoto, with a pledge to cut emissions of key greenhouse gases by 21% by 2012; in fact it had already achieved 18% by last year. (The UK, it should be said, has done as well).

But there's a sting: as with us, much of this was due to closure of old industry, and since 1999 progress has stopped. Undeterred, Germany has used its six-month Presidency to push the EU into even bigger efforts. The March 2007 summit committed the 27 members to cut CO<sub>2</sub> emissions by 20% by 2020, by increasing energy efficiency by 20% and raising the role of renewable energy by 20%: the “3

times 20” formula. But Germany has pledged to do much better: a staggering 40% cut, from 880 million tonnes to 270 million tonnes.

For Germany, this is a win-win formula. Historically, if you remember your history (and I mean apart from all they ever teach our kids now, which is about the Nazis), Germany developed much later than we did, after it got unified in 1871, and it was based on applying top-quality scientific research to what were the high-technology industries of their day: electrical and electronic goods, optical products like microscopes and cameras, chemicals, cars – many of which goods, like the motor car, they actually invented. *Vorsprung durch Technik*, the line that Audi so successfully used in their advertising in the 1990s, could have been a national slogan. After 1945, Germany lost leadership in technological innovation to the United States and Japan. But companies like Siemens or Jena or Mercedes remained much stronger than their British equivalents, and the German economy has retained a much bigger element of advanced manufacturing than ours.

Now, Germany sees a real prospect of again achieving global technological leadership in new industries, creating yet another industrial revolution. (If you like the theory of long waves of economic development, which was developed by the great German-American economist Joseph Schumpeter who taught at Bonn before he migrated to Harvard, will identify this as the long-awaited fifth Kondratieff). This time around, the great economic driver will be environmental technologies: solar power, wind and wave power, energy conservation techniques. Germany’s Renewable Energies Act came into force seven years ago and has triggered a frenetic response: already, 12% of all the electricity consumed in Germany comes from wind, solar and water power.

The government are backing the drive with three billion euros of additional spending over the next three years.

The result, to quote Burkhard Schwenker of Roland Berger Energy Consultants, is that rapidly “Germany is rapidly assuming the role of world leader in this field”. On behalf of the Germany Federal Government, they interviewed almost 1,500 German environmental technology companies and evaluated a number of other studies in order to compile an eco-atlas of Germany that was officially published at the European Union’s environmental summit in June. They conclude that energy and ecology-related occupations are becoming Germany’s number-one job engine. His colleague Torsten Henzelmann says that “By 2020, this sector will be employing more people than mechanical engineering or the automotive industry”. He calls it “the boom sector of the 21st century”.

Companies’ order books are full, boosted by the Federal Government’s target to cut greenhouse gas emissions by 40% by 2020. This year, the German Renewable Energy Federation (BEE) expects turnover to grow by 17% compared to 2006 to a grand total of 32 billion euros. At the same time, 15,000 new jobs are planned in Germany this year. According to the BEE, approximately 214,000 people were already employed in the industry in 2006. A study conducted by the Federal Ministry for the Environment projects that 150,000 new jobs will be created by 2020. The background is that German companies are already market leaders and are now benefiting from the increasing global demand for clean and innovative energy technologies.

Burkhard Schwenker forecasts that by 2030, green industries could be generating a turnover of one trillion euros. And he cites the areas where Germany has already attained the lead: it has the largest installed wind power input, has the most modern power station technology, and leads the world in the output of efficient household devices. Germany produces one third of all the solar cells and almost a half of all the wind turbines in the entire world. Renewable energy exports rose to six billion euros in 2006: a 30% increase on the previous year.

The export potential is huge. Already, Germany is systematically promoting sustainable energy in the developing world: solar energy in China, wind power in Egypt and Morocco, hydro in Indonesia, biomass in Nepal, geothermal in Kenya. This kind of deal, long pioneered by France in areas like transport technology (TGVs in Korea and Taiwan as well as the UK and Spain), makes huge economic sense: once you've perfected a technology you can confidently sell it in the certainty that it will work without hitches first time (our Channel Tunnel Rail Link), and that each iteration will generate progressive economies of scale. That's the way Germany sold electric power plants in the 1890s. It's the way it will sell its green successors in the 2010s.

All this is creating a huge demand for new qualified workers: engineers, mechanical engineers, chemists, physicists and project developers. They have to be produced, and the German government is busy at work on the issue. Sigmar Gabriel, Federal Minister for the Environment, launched a training initiative: *Umwelt schafft Perspektiven* (The Environment Creates Prospects) last year. It too has been a success: companies and employers' associations have already promised 5,100 new

training places. Many universities and colleges already offer special programmes or options in this area within their courses. For example, degree courses in mechanical engineering often allow students to concentrate or specialize on fields such as renewable-energy and materials technology, energy supply and renewable energies for power generation. Similarly, traditional courses in electrical engineering and information technology now frequently offer specializations in renewable energies and electrical energy systems. Universities and colleges offer further subdivisions such as technical building services, energy plant technology, power engineering, environmental technology and wind energy technology. In addition, there are numerous further training courses on offer, for example as a solar or energy consultant. The degree courses are modular in structure and usually last seven semesters. And they are very practice-oriented: practical work experience within a company is usually part of the main study programme.

The German government recently completed an evaluation of their fourth energy research programme, covering the period 1996 to 2005, in the field of renewable energy. They conclude that Germany has the most successful research promotion in the field of photovoltaics, is second only to Denmark in wind energy, and comes in joint top position with Austria in low-temperature solar power research.

This underlines a rare historic irony: Germany's original rise to world economic power, in the 1880s and 1890s, was based on its ambition to rival the UK and France and Russia as a global military power. The fairly direct result, in 1914, was World War One. The indirect result, following the fiasco of the Versailles treaty and the rise

of Hitler, was World War Two. Now, one could fairly say, we are witnessing the beginnings of World War Three. But this is a war like no other: it is a war of humanity itself, in a desperate struggle to save the world it inhabits.

Other far-seeking entrepreneurs in other advanced countries are anticipating and responding to this challenge - predictably, above all, in America. *The Economist*, at the end of May, carried a piece showing how Massachusetts, Texas and California are positioning themselves to become leaders in the new “clean-tech” revolution. Already, venture capital investment in clean-tech has doubled in two years to \$2.9 billion, making it the third largest recipient of venture funding after biotech and computing. In fact, according to *The Economist*, investment is already four times higher than in Europe. Unsurprisingly Silicon Valley is the early clean-tech leader, with \$638m invested last year. Many engineering and entrepreneurial types were at loose ends after the dotcom bust, and were also hit by California's rolling blackouts. So when Mr Schwarzenegger introduced incentives, especially for solar power, he got a rapid response. Boston is probably the next-biggest clean-tech cluster, with more than \$250m was invested in Massachusetts last year, boosted by research in MIT and Harvard. Another contender is Austin—the “capital city of the most polluting state in the most polluting country in the world”, as the mayor likes to say. Some \$210m of venture capital was invested in clean-tech across Texas last year.

So, ironically, that great struggle of the 1890s, between the UK, Germany and the US, for world leadership in the application of scientific research to technological development and economic growth, is repeating itself just over a century later. The

outcome of this titanic struggle could be altogether more benign than its earlier equivalent. In fact, it could result in the salvation of us all. But where, in this cosmic drama, are we?

Not very far, is the conclusion. Of course, we have strong research and also application of research through consultancy: Arup is a world leader in environmental engineering. But, because we started later and less enthusiastically, we're running behind the leaders.

If we want to catch up, how? And where? The answer to the "how" question is to go the German route: systematically promote research and research training in our universities. But we lack the great strength of the German technical universities, or MIT. Insofar as it's there, it's highly concentrated in London. Of course the great northern civic universities are seeking to make waves in applied research through their Science Cities programme – and quite right too. Earlier this year, the Northwest RDA launched the Northwest Science Strategy 2007, based on Manchester and Liverpool Universities and the Daresbury Research Complex. Alistair Darling, then industry secretary, reminded the audience that the region's three main universities numbered 28 Nobel prizewinners, and told them the government would back the initiative to the hilt. But Manchester's Vice-Chancellor confessed that: "we have a very big chasm to jump and it is getting wider".

So, if only because of the lead given by Ken Livingstone to make London a world leader in urban sustainability, there's a huge opportunity here. And there couldn't be a more logical location than East London, for two key reasons. First, out at Barking

we already have the Ford-financed Centre for Manufacturing Excellence. And second, in the lower Lea Valley we have an unequalled opportunity to create a new research park as part of the ongoing programme of regeneration, during and after the 2012 Olympics. The model is there in Germany: it's the Dortmund Technology Park, established over twenty years ago by the local university and a huge success – so much so, that they've started another one. There, they decided that since the local Ruhr area was desperately in need of clean technology to replace the disappearing 19<sup>th</sup>-century industrial base, they'd make that the focus of their research and development efforts, encouraging spinoff from university research. Established in 1985, the Dortmund Technology Park extends over 21.5 hectares, with 60 buildings offering 210,000 m<sup>2</sup> of floorspace, housing 230 firms with 8500 workers. The new park, on the site of a former steel plant, is five times the size, 110 ha, and has a variety of high-technology industry.

Dortmund isn't the only model that Germany could offer us. But it's a particularly interesting one, because it has succeeded in regenerating a city that had real economic problems because of the decline of its traditional industrial base. In fact it's more comparable with a northern one-industry city than with London. In comparison we have immeasurably more going for us, both in our previous manufacturing tradition and also in the scientific contribution of London's universities. The time is exactly right for a visionary strategy of reinventing East London's industrial base around the new leading-edge industries of the 21<sup>st</sup> century, and to do so as a central part of the Olympic legacy.