

PHOTOVOLTAICS IN CHINA

AT THE TWAS CONFERENCE IN TIANJIN, WANG SICHENG, A SENIOR RESEARCHER IN SOLAR ENERGY AND CURRENTLY DIRECTOR OF THE ENERGY RESEARCH INSTITUTE AT CHINA'S TOP ECONOMIC PLANNING BODY, THE NATIONAL DEVELOPMENT AND REFORM COMMISSION (NDRC), OUTLINED THE STATUS OF PHOTOVOLTAICS IN CHINA AND THE INCENTIVES THAT THE GOVERNMENT HAS PUT IN PLACE TO ENSURE THAT SOLAR ENERGY BECOMES A VIABLE ALTERNATIVE TO FOSSIL FUELS.

Spending a day out in Tianjin after the conference is over, two things strike you. First, the impressive construction projects taking place everywhere on a huge scale. Second, the grey mist obscuring your view of these same majestic buildings.



a major contributor to its greenhouse gas total.

The more China is successful as an industrial nation, the more energy it needs, and the more greenhouse gases it inevitably emits. China's coal consumption tripled

That mist is not excess moisture in the air, but pollution. While nowhere near equivalent to the lethal 'pea soup' smog that threatened the inhabitants of London in the late nineteenth century, the cause is essentially the same – the burning of enormous amounts of fossil fuels needed to generate electricity for industrial production and transport. Eighty percent of China's electricity is now generated from coal, which is responsible for 85% of the country's sulphur-dioxide emissions and

between 2000 and 2010. And yet, even this huge amount is not enough: it has been estimated that China needs to quadruple the amount of power it generated in 2005 to meet its needs in 2030. Decreased industrial activity is not an option: China must maintain its rate of production in order to feed, clothe, house, and employ its burgeoning population, and to raise the standard of living of the many still in poverty.

On the other hand, in what has been described by Beijing-based international environmental journalist

WATER, WIND, SUN

China deploys three main sources of renewable energy: hydropower, wind power and solar power. The Three Gorges Dam on the Yangtze River in Hubei province is the world's largest hydroelectric power station and there are plans to build 7 wind power "mega projects" by 2020 bringing China's wind power capacity to about 75% of current world capacity. Until recently, solar power was trailing behind a poor third, but China is now the world's largest producer of solar panels and plans are in place to deploy more and more off-grid systems throughout rural China.

Cristina Larson as the 'great paradox of China', China now also looks set to become, by 2020 if not before, the world's leader in renewable energies at all levels: in research investment, in manufacturing and supply; and in deployment, exhibiting what at first sight seem to be two entirely incompatible elements: both 'green energy' and 'black skies'.

So how can China contend with these two contradictory pulls: a drastic shortage in the energy supply on the one hand, and serious environmental pollution on the other, which is not just lowering but seriously threatening the quality of life. Indeed, some claim that the disproportionately high rates of cancer-related disease, and the limited access to quality water supplies for millions of rural poor, for example, are a direct result of pollution. In addition, the

How can China contend with a shortage in the energy supply and serious environmental pollution?

World Bank estimates pollution damages cost the equivalent of 5.8% of China's annual gross domestic product.

Across the globe, but especially in China, just a short decade ago, the future for renewable energies looked bleak: fossil fuels were readily available and relatively cheap, and the infrastructure already existed for their exploitation. Investing money in renewable energy meant substantially increasing production costs, counterbalancing the competitive edge China had enjoyed for many years owing to cheap labour costs, meaning that the ubiquitous 'made in China' products would be out of a market. Until recently, indeed, weighing up China's immediate needs, closing a blind eye to pollution and going full steam ahead with industrial expansion must have seemed like a necessary price to pay.

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It was beginning to seem inevitable that the Chinese were destined to have their beautiful new cities marred by smog. But the Chinese government has taken concrete and effective action to correct this trend, and indeed, in the 12th Five-Year Plan, adopted on 14 March 2011, China introduced measures aimed at turning the situation around. The Plan is wide-ranging and comprehensive in terms of environmentally sustainable measures, including: increased forest cover; greatly improved rail transport (connecting cities via high-speed trains and within cities through subway and light rail systems); strict motor vehicle emission standards; and wastewater and solid waste treatment plants. There is also a strong emphasis on reuse and recycling.

In the Plan, too, China has confirmed its intentions to cut its carbon footprint and become more energy efficient by reducing greenhouse gas emissions, reducing its reliance on fossil fuels and making a huge investment in renewable energies. The Plan sets a goal of 9.5% of overall energy usage to come from renewable sources by 2015 and designates new low-carbon energy technologies as a strategic industry to spur economic growth.

China's 12th five-year plan introduced comprehensive environmental measures.

SUNLIGHT AT THE END OF THE TUNNEL

At the TWAS conference in Tianjin, Wang Sicheng, an expert on solar energy and currently director of the Energy Research Institute at China's top economic planning body, the National Development and Reform Commission (NDRC), outlined the status of photo-

voltaics in China and the incentives that the government is putting in place to ensure that solar energy becomes a real alternative to fossil fuels – and a viable business proposition.

Among the incentives Wang listed were: the Renewable Energy Law; the National Plan to set near and long-term targets for renewable energy; a government supported research and development programme for photovoltaics (USD80 million per year); well designed business models and innovative financing mechanisms; and government-sponsored projects to deploy renewable energies in rural areas.

“These interventions”, said Wang, “mean that significant progress has been made in photovoltaic research and development, mass production, cost reduction and domestic market expansion.”

As a result of investment in research and development, and owing to government subsidies to solar panel manufacturers, this government strategy has almost been too effective: China has now become the biggest producer of solar panels in the world, dominating the global market, and entering into an increasing price war with the United States, which has retaliated with duties on Chinese imports. The result, for the Chinese industry in the short term, has been extraordinary overcapacity, with a glut of Chinese solar panel companies, some of which have collapsed. Indeed, even China's largest panel maker, Suntech Power Holdings, has needed emergency funding from the government to stay afloat.

But, with the government's most recent plans to increase domestic deployment of solar panels, this glut is no longer a problem. The goals for photovoltaic installations have become more ambitious with each consecutive 5-year plan. Initially, the quota was set at 18 GW by 2020, now the goal is already 50 GW by 2020 (although even this target could be exceeded).

Reports show huge jumps in installed capacity and production throughout China.

BEAUTIFUL NAMES

In his presentation, Wang talked enticingly about the 'beautiful names' attached to many of the government's incentive programmes for solar energy, and indeed they do inspire: 'The Tibet Sunshine Project', 'The Golden Sun Demonstration Programme', and the 'Brightness Programme'.

When the People's Republic of China was founded in 1949, the vast majority (over 90%) of the rural Chinese population was not connected to the national grid.

According to latest figures, electricity now reaches 99% of that rural population. But this has not been achieved solely by extending the grid, which, given the remote locations and low density of households, is not always cost-effective. Off-grid renewable energy technologies have been more efficient and effective in many cases. Where possible, the government has preferred to build self-contained small hydropower stations, which are cheaper than wind and solar energy systems to install and maintain, but where local conditions are not favourable (where there is no natural water supply, for example), solar and wind energy are being deployed. When the local demand for electricity is not large, solar energy can be reliable and cost effective,

especially as the cost of both materials and installation continues to decrease.

The Brightness Programme began in 1996 with the aim of providing electricity (through solar and wind applications) to 23 million people located in Gansu, Qinghai, Inner Mongolia, Tibet and Xinjiang provinces by 2010. Indeed, the target of 100W of capacity available per person has been reached. The first stage of the programme (1999-2002) provides electricity from single photovoltaic solar home systems and from village photovoltaic battery systems to 50,000 people in three provinces. The second stage (2002-2005) was the Township Electrification Programme, one of the largest of its kind in the world. With a total investment of USD 700 million from both central and local government special funds, over 1,000 townships (located in the western provinces) were electrified in less than 20 months, providing almost one million people with electricity. The third stage (2006-2010) – The Village Electrification Programme – brought electricity to around 20,000 villages, all of them located in off-grid western regions of the country.

The Chinese government currently estimates that, by 2020, only 1.5 million people will be without electricity. That's not bad for a population of over 1.3 billion – half of whom live in rural (often remote) areas spread over a vast area.

As well as providing power to millions of people, it seems that photovoltaic panels (along with the deployment of other renewable energy solutions, and policy measures to reduce greenhouse gas emissions) are beginning to ease the daunting problem of pollution in China.

Let's hope that, on our next visit to China, we will have a clearer view.

