

Offloading the harm on China

China's share of the global chemicals market has more than tripled in ten years, rising to 27% in 2011. The growth has come with major health and environmental impacts. The big picture is hard to recreate as the information is still classed as state secrets.

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20 years of double-digit growth have taken their toll on the "workshop of the world".

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The chemical industry is run by a handful of multinational mega-corporations. Its geographical distribution has changed profoundly over the last thirty years. High value-added products were long the preserve of industrialized Europe and North America. Asia, Africa and Latin America were mainly sources of raw materials before gradually being endowed with basic chemicals plants and some specialized production channels focused on local markets for agricultural fertilizers and pesticides, synthetic fibres and dyes for textiles, polymers for the plastics industry, etc.

Most of the big chemical companies in these three continents were owned by European and North American multinationals, except in the few countries with state controlled industries. Two big factors shaped the global division of labour: the labour skill and infrastructure value-added components of production, and transport costs (higher production volumes can make it more cost-efficient to produce and process near raw materials sources or local markets).

From the 1960s, other factors came into play. In developed countries, pressure of public opinion to protect health and the environment led to the development of legal precautionary and public information obligations. Business was moved to areas where laws were less stringent or more laxly enforced. Over time, the most hazardous waste was legally or illegally exported to the poorest countries, where it caused serious problems.

The "Green Revolution" revolutionised agricultural production methods with the large-scale use of synthetic chemical inputs. The resulting loss of biodiversity had to be offset by the mass use of pesticides. Natural fertilizers gave way to industrial fertilizers. Local industrial development had a knock-on effect on the chemical sector. Urbanization increased the use of everyday chemicals.

China enters the top ten

Overall, Europe and North America have kept a substantial share of high value added chemical production. The aggregate value of European output has risen steadily over the last twenty years, but its market share fell from 36% in 1991 to 20% in 2011. These percentages are net of the pharmaceutical industry, where Europe retains leadership with close to 30% of world production.

Irrespective of where their production is located, the multinationals control huge swathes of the industry through a variety of

mechanisms ranging from setting up subsidiaries to equity investments in other groups, not forgetting the exploitation of patents and intellectual property rights. Of the ten multinationals that dominate the global chemical industry, four are European and three American. The others entered the top ten only recently. China's Sinopec has risen from 26th place in 2001 to 3rd in 2011. In the same period, Formosa Plastics (Taiwan, with significant investments in both China and the United States) has jumped from 30th to 6th and SABIC (Saudi Arabia) from 18th to 5th.

Production is shifting to Asia (mainly China), especially for basic chemicals manufacturing – the large volume production of basic and intermediate compounds for other manufacturing processes. China is now the world's largest producer of methanol and toluene. It shares the top position with Korea for xylene (approximately 15% each), while other organic chemicals are still manufactured mainly in the United States (ethylene, propylene) and Europe (benzene and butadiene).

China ranks first both as a producer and consumer of inorganic chemicals (mostly for agriculture), and is also the foremost producer and consumer of halogen compounds used in a wide range of manufactures in a variety of sectors (plastic, steel, pesticides, etc.).

Despite annual growth above 25% between 2000 and 2010, China's consumption of both basic and fine chemicals far exceeds its output. China's trade balance deficit in this sector topped \$50 billion in 2008. One objective of China's 12th Five Year Plan (2011-2015) is to achieve self-sufficiency in fine chemicals. As well as production plants, China is home to a growing number of research and development centres at which BASF, AkzoNobel, Bayer and Dow Chemical have developed major projects.

According to American Chemistry Council projections, chemical production is projected to grow by 66% in China between 2012 and 2020, followed closely by India

(60%), then Russia, Brazil and Korea (35%), with Western Europe and North America (25%) bringing up the rear.

Health and environmental impacts

The health and environmental impacts stem from a combination of the intrinsic hazards of the chemicals produced, the conditions of production and use throughout the product life cycle, and the social and political context.

The intrinsic hazards are much the same wherever production is located. Efforts to replace the most hazardous chemicals and develop a green chemicals industry are limited. For some of the most hazardous chemicals, however, the differences are significant. For instance, China is now the world's second largest producer and largest consumer of asbestos fibres. Just 158 chemicals are subject to import restrictions, and only a score of these are banned outright.

Conditions of production and use are concerning in both chemical manufacturing and the downstream chemical-using branches. Most of the obtainable information concerns the rising toll of major accidents. Official statistics from the Chinese Ministry of Environment report 542 such accidents in 2011, while the Chinese Academy for Environmental Planning estimated their cost at \$220 billion in 2009.

This estimate takes no account of the long-term public health and environmental effects. The pollution of the Songhua River in northeast China when more than 130 different organic pollutants, including many carcinogens, were identified was a wake-up call. It was the result of an explosion at a chemical plant on 13 November 2005, when more than 100 tonnes of highly toxic chemicals were discharged into the river, forcing the authorities to cut off the drinking water supply to Harbin, a city of 4 million people.

A WHO report estimates that environmental pollution causes 2.4 million premature deaths a year in China.

Political and social conditions significantly increase the risks. There is an extreme concentration of power and wealth in the ruling establishment formed by the single party bureaucracy, the state apparatus and national resource owners. In July 2013, economists studied the link between a political career in the Communist Party and the environmental conservation efforts of local leaders. They came to the clear conclusion that higher city-level GDP growth is statistically and economically significantly correlated with better odds of the city's top cadres being promoted. In contrast, higher city-level environmental investment is statistically and economically significantly negatively correlated with the odds of the city's top cadres being promoted¹.

There are no independent trade unions, only a handful of constantly repressed small protest groups. There are all manner of local direct grassroots actions, but police enforcement is everywhere, so they remain uncoordinated and non-convergent.

Aggregated environmental impact data abound and tell a disastrous story. A 2009 World Health Organization report estimates that environmental pollution causes 2.4 million premature deaths a year in China².

By contrast, there is no overall research into the occupational health impacts. Specific studies are available on particular diseases or the risks in particular companies or sectors, but there are no obtainable overall data. The official figures on occupational diseases show only that the vast majority of victims are not compensated. In 2010, China recognized just 27 240 cases (over 80% of them pneumococcosis), while in the same year, France recognized over 50 000 occupational diseases.

A broad brush picture painted from the obtainable data shows an alarming increase in work exposure-induced cancers and a rise in respiratory diseases. Future generations are being put at risk by industrial activities, with a dramatic increase in birth defects. The Ministry of Health publishes no systematic data on health inequalities, and the specific influence of working conditions on them remains a taboo subject. The copious administrative records kept on employment and health³ could enable epidemiological studies to be done, but the political will is not there.

Most of the obtainable data relate to regional differences which in many respects correlate with the social disparities between the poor peasantry and urban populations. They also reveal a 13 year life expectancy at birth differential (65 to 78 years of age in

2000). Foreign analysts of Chinese health statistics point to growing social inequalities, but lack sufficient data to consider the specific role played by work-induced diseases or industrial pollution⁴. Other factors are better documented. The sharp rise in income inequalities over the last thirty years has made China one of the most unequal countries on Earth, overtaking the United States and approaching Nigeria and Brazil. Accessing health care is hard for non-privileged groups: in 2010, the social security system reimbursed just 23% of hospital expenses.

Cancer villages versus green cities

Community action groups have been campaigning for a decade against the existence of cancer villages – localities where industrial pollution-induced cancer mortality has reached alarming levels, as evidenced by numerous studies, especially in areas of high employment in electronics industry waste recycling, some of it imported and some from the domestic market.

The official press has long censored most of the information. This has now backfired, and many people now find the Internet more credible despite government censorship imposed with the help of big online companies (including Google, Yahoo and Microsoft). Activist journalist Deng Fei blogs mostly about pollution on Weibo (China's vast microblogging network), where he has three million followers. In 2009, Deng Fei published a first map identifying dozens of villages or village clusters where excess mortality from chemical pollution-induced cancer had been detected⁵.

One response by the bureaucratic and financial elite is to increase the number of "green cities" – new towns built at a distance from major cities. Dongtan north of Shanghai was supposed to house half a million people by 2050. Launched with great fanfare in November 2005 by Tony Blair and Chinese President Hu Jintao, the project was shelved due to a corruption scandal and probably its grandiose nature. An eco-town is being built 40 km from Tianjin in the north. It could have a population of 350 000 by 2020 and 5 000 apartments had already been sold in February 2013. This project has attracted more than \$4 billion in inward investment.

A car-free town of 80 000 inhabitants is planned near Chengdu, the capital of Sichuan province in south-western China. Such projects promote walking and cycling; green spaces abound; the buildings are constructed

The Environment Ministry has published the first official map identifying over 400 "cancer villages".

to the most advanced environmental standards, while the infrastructure is designed to minimise carbon emissions and prevent pollution. There is an organized recycling scheme. The high cost of housing makes these towns affordable only by the privileged classes. They are a combination of eco-towns for the wealthy and so-called "gated communities" – walled-in residential areas cut off from the public domain, with an entrance that may be guarded by private security guards and electronic surveillance systems.

1. Wu Jing *et al.* (2013) Incentives and outcomes: China's environmental policy, Finance Working Paper, 368, ECGI.

2. Junfeng Zhang *et al.* (2010) Environmental health in China: progress towards clean air and safe water, *The Lancet*, 375, 1110-1119, 27/03/2010.

3. Camp *et al.* (2003) Development of a cancer research study in the Shanghai textile industry, *International Journal of Occupational and Environmental Health*, 9, 347-356.

4. Feinian Chen, Yang Yang, Guangya Liu (2010) Social Change and Socioeconomic Disparities in Health over the Life Course in China. A Cohort Analysis, *American Sociological Journal*, 75 (1), 126-150.

5. The map can be viewed on <http://chinadigitaltimes.net/2009/05/a-map-of-chinas-cancer-villages>.

The World Bank published a lengthy report on "Sustainable low-carbon city development in China" in 2012 which extensively documents the technical and financial aspects of such development but glosses over its social implications⁶. Ultimately, while carving out separate living areas for the privileged few may reduce the impact of chemical pollution on their health, it will not roll back its consequences. The creation of green cities is probably more oriented to practical political and social goals: they create conditions conducive to the endogenous development of the new Chinese bourgeoisie, creating the illusion that they are safe from social unrest and contacts with the "dangerous classes".

The Mongolian navy

So great has the scale of chemical pollution become of late that the government is allowing limited press reporting of it. In January 2013, Beijing suffered three weeks of air pollution peaks which on 12 January hit the frightening level of nearly 1 000 micrograms/m³ – a level of 300 micrograms/m³ is considered a serious risk. In February 2013, the Environment Ministry published the first official map identifying over 400 "cancer villages".

Environmental concerns are increasingly featuring in the official rhetoric, but the problem tends to be spun as the inevitable consequence of a rapid transition towards industrialization. Challenging social inequalities or the monopoly of power are not on the agenda. The subtle blend of transparency and censorship wielded by the authorities can be unpredictable.

Beijing lawyer Dong Zhengwei asked for information on soil pollution 30 January 2013, but his request was refused because "the survey data on soil pollution are state secrets according to the provisions of Article 14 of the Open Government Information Regulations".

In July 2013, Environment Minister Zhou Shengxian publicly acknowledged his department's record as one of the four worst government agencies in the world. Bloggers had a field day picking out the other three, the wittiest suggestion being the Mongolian Navy (the country is landlocked and has had no fleet since the 13th century).

There is little hope of a "top down" reform initiated by the Chinese authorities, although some factors could work in its favour. Dwindling in-migration by poor peasants to industrial areas has brought home to the authorities that they no longer have an endless supply of

troops for industry. There is increasing pressure from countries that import Chinese goods to reduce the risks from the toxic substances they may release. The pressure is particularly strong for toys, for which China is now the world's biggest producer, often subcontracting for major brands, but also increasingly so for other consumer goods. A 2012 Greenpeace study reported different toxic substances found in clothing sold by big international brands⁷, some of which was made in China.

The obstacles to a comprehensive reform remain overwhelming: no independent unions, corruption, weak labour inspection and environmental standards enforcement bodies. Most of all, the question is how much the authorities can do. Demand for profits from national resource-owners and foreign investors, the monumental expenditure needed to develop a social security system to cope with an aging population, and the wage demands of workers arguably do not leave much scope for investment in bringing down chemical risks. ●

An exponential rise in dollars and deaths

A recent report by the United Nations environmental protection agency* demonstrates the rapid growth of the chemical industry, whose global output valued at \$171 billion in 1970 rose to \$4 120 billion in 2010 (figures not inflation-adjusted), and could comfortably top \$6 000 billion by 2020. The Chemical Abstracts Service (CAS), which manages the world's largest register of chemicals, estimates there to be some 250 000 substances on the world market. Factoring in mixtures of different substances takes the figure up into the tens of millions of products. The Organization for Economic Cooperation and Development (OECD) has compiled a list of over 5 000 substances produced in quantities greater than 1 000 tonnes per year.

Emissions of dust, fumes and toxic gases are fuelling the global ecological crisis through global warming, pollution, loss of biodiversity, etc. Ecosystems across the globe are heavily contaminated by synthetic chemicals including in areas far from all industrial activity such as Antarctica. Ninety percent of fish samples tested in the world are contaminated with pesticides. The

chemical industry is energy-intensive and has a big carbon footprint. Electronics industry waste was estimated at 20 to 50 million tonnes per year in 2005, an alarming share of which was toxic chemicals.

Every human being is exposed from before birth to death to cocktails of chemicals whose known effects are concerning and most of whose long-term impacts are unknown. In 2010, World Health Organization researchers published a study to estimate the overall burden of disease due to chemicals. Based on the available scientific literature, they concluded that in 2004, 4.9 million deaths (8.3% of total deaths worldwide) were attributable to exposure to chemicals**, while a total 86 million years were lost due to ill-health, disability or early death (5.7% of the total health problems measured by this indicator). These are conservative estimates based on previously analysed consequences of documented exposures.

*UNEP (United Nations Environmental Programme) (2013) The global chemicals outlook. Towards sound management of chemicals, Geneva.

**Prüss-Ustün A. *et al.* (2011) Knowns and unknowns on burden of disease due to chemicals: a systematic review, *Environmental Health*, 10 (9), 1-15.

6. Baeumler A., Ijjasz-Vasquez E., Mehndiratta S. (2012) Sustainable low-carbon city development in China, World Bank, Washington.

7. Greenpeace International (2012) Toxic threads: the big fashion stitch-up, available at: <http://www.greenpeace.org/international/Global/international/publications/toxics/Water%202012/ToxicThreads01.pdf>.