

China's greenhouse challenge

Key Findings

- **China was, together with the U.S., the world's largest emitter of greenhouse gases in 2005. A majority of these emissions are fossil fuel related. China is very carbon intensive by international standards - without drastic improvement in Chinese carbon intensity, it will not be possible to keep global temperature rise within 2 °C.**
- **China accounts for just under one tenth of global historical emissions but could reach its global population share of one fifth as early as the 2020s if emissions continue at the current pace.**
- **China's annual per capita emissions are just above world average, but only one quarter of the U.S. level. With the current momentum in CO₂ emissions China is quickly catching up with the developed world.**
- **China's negotiation position is weakened by these rapidly increasing emissions. Its position is changing from being a victim of other countries emissions to becoming a leading contributor to global emissions.**
- **Current Chinese climate policies are driven by energy security, aiming to reduce energy intensity by 20% by 2010. If met, this unarguably represents the largest policy driven reduction of CO₂ emissions worldwide.**
- **As low-carbon development pathways become increasingly mainstreamed the choice is either for China to change or be left behind.**

Carbon intensity and future emissions

From the beginning of reforms in the early 1980s to the late 1990s, energy intensity in China grew only half as fast as its GDP (Gross Domestic Product), meaning that China was managing a unique development path where national and per capita incomes grew while energy intensity (and thereby CO₂ intensity) fell. But since the turn of this century the trend of national and per capita incomes growing while energy intensity falls has been reversed. Consequently, Chinese energy intensity is currently in a league of its own.

Figure 1 shows CO₂ intensity for Chinese provinces and China as a whole (represented by the grey diamond) vs. its GDP per capita. As shown, China and most of its provinces are near or above the 90th percentile (0.8 tons of CO₂ emission per 1,000 US dollars purchasing power parity) of CO₂ intensities. Few countries share the Chinese provinces' high emissions intensity, and even fewer combine this trait with a similar range of income per capita.

Per capita emissions soon to exceed European levels...

China's annual per capita emissions are already above world average, but still only one quarter of the US level. But with the current momentum in CO₂ emissions, China is rapidly catching up with the developed world. If China continues at its 2007 rate of 8% annual increase of energy use, and the EU meets its

20% reduction target, China's per capita CO₂ emissions will be double the EU's by 2020.

...and its contribution to global cumulative emissions is constantly growing

Currently China accounts for just under one tenth of historical cumulative emissions since 1900, but China's share of cumulative emissions increases with later starting years. From an equal per capita cumulative emissions perspective it seems therefore as if China has considerable space for further emissions up to its global population share of one fifth, and even further up to the level of Annex 1 countries. But even in the case of cumulative emissions China will soon reach its global share if emissions continue to grow at the current pace.

Energy intensity is a measure of the amount of energy required for every dollar produced in the economy. It is often used to compare the productivity of different economies, and says something about the cost and resource efficiency of production. The lower the energy intensity of an economy, the more energy efficient it is per unit of production.

Carbon intensity refers specifically to the amount of carbon required for every dollar produced in the economy.

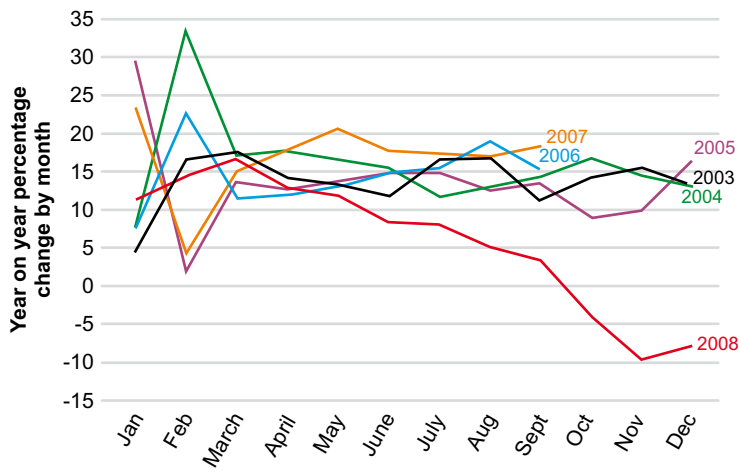


Figure 3: Growth Rate of Chinese power generation

The need for low-carbon growth

Chinese policies aim to return China to a development path with growing wealth and falling energy intensity. Chinese leaders have also expressed an ambition to extend similar targets to subsequent five-year plans up to 2020. (See SEI Policy Brief ‘China acting on climate change’ for further details)

No country has yet managed to reduce its emission intensity during such development as which China finds itself now. But neither are there examples of industrialised, high income countries with emission intensities as high as in China. This suggests there are opportunities for China to realign to its earlier development path of increasing incomes and decreasing emission intensity.

The quick adoption (at least on a rhetorical level) of the low carbon development concept, as well as rapid growth in some of the renewable energy sectors (such as wind and solar) are indications that China’s political ambition, and the business opportunities generated by its policies, have begun to lead to alternative and more sustainable development paths.

Impact of the financial crisis

The financial crisis has had considerable impacts on emissions growth. Figure 3 shows that power generation decreased rapidly in the second half of 2008. However, there are several possible explanations behind the unprecedented drop in electricity generation, including an overall impact from energy conservation policies. No one knows when and how fast power generation will recover, but the coming one to two years could offer a breathing space from increased power sector emissions.

The financial crisis and associated economic adjustments provide an opportunity for China to redirect towards a low carbon development path. If the government invests in energy conservation and low carbon development as a means to maintain economic growth, China’s energy intensity could fall by 5% or more.

But sooner or later power generation will pick up, and the official government plan is to double current capacity to

6,500 GWh by 2020. In 2008 China’s power generation increased by 90 million kW, of which over one quarter was renewable. At the same time 17 million kW worth of small, inefficient coal fired power plants were shut down. Although this indicates that the current policy framework is beginning to change the energy configuration, China must add a much higher share of non-fossil power in coming years in order to decrease the long-term share of fossil power.

Scenarios and projections for China’s future emissions

Even with successful carbon mitigation in line with current policy ambition, more has to be done. Figure 4 illustrates a range of different emission projections for China, and when combined show the wide divergence between business as usual scenarios (China’s development continues with no or only small technology gains and thereby at near constant energy intensity), baseline scenarios (assuming development in line with successful implementation of and continuance of current policy to reduce carbon intensity), and deep reduction scenarios (backcasting how much reduction is needed in China to keep global temperature within the 2 °C target, or assuming the maximum technically realistic abatement opportunity).

The different scenarios indicate both the opportunity to make considerable progress towards climate security in China and on the importance of coming to an international agreement that can harness the significant opportunities for China to continue to develop while slowing down emissions growth.

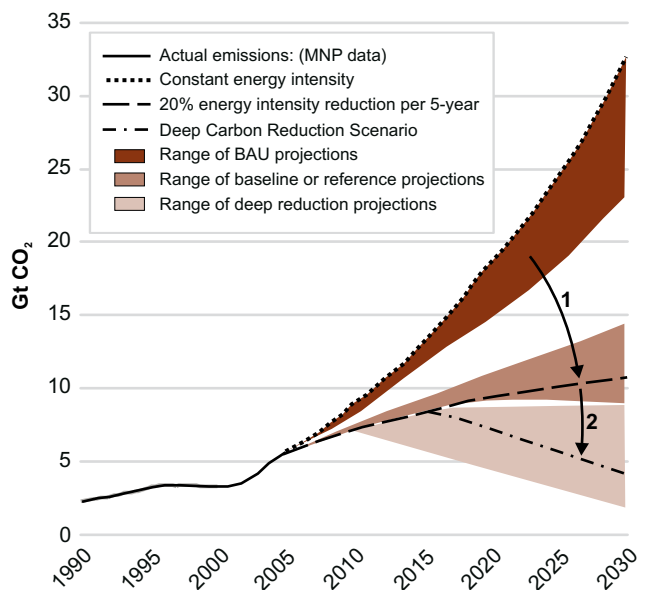


Figure 4: Possible emission projects for China

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The upper arrow (1) illustrates the considerable curb of carbon emissions that China’s current ambition to reduce energy intensity by 20 percent per five-year period would imply if it were extended to 2030. The lower arrow (2) shows how much more would be needed for China to reach a low-carbon emission trajectory in line with what would be needed for the world to meet the 2°C target.

The arrow in the diagram represents the additional effort required to close the gap between successful implementation of current policy and what is needed to keep global temperatures within the 2 °C target.

Balancing opportunities and risks

With rapidly increasing emissions China's negotiating position is weakening by the day and China is losing standing within the international community. The Chinese business community has recognised the considerable low-carbon opportunities for China in profiting from growth driven by innovation and technology.

The coming decade is a strategic window for China to balance opportunities and risks in the climate negotiations and

coincides with a period of massive domestic investment in infrastructure development. As the low-carbon economy model quickly becomes the mainstream, the choice for China is either to change with other dominant countries or be left behind. The timing of this 'role switch' in the climate negotiations is critical – the sooner it happens the more likely that China will have a proactive position.

With current policies, China is heading in the right direction to combat the effects of climate change. However, in order to successfully keep global temperature rise below 2 °C, further efforts will be needed. China will need help in catching up the extra speed needed to make this happen, both through technological innovation and international support.

Recommendations

Investment in and roll out of renewables should continue

The rapid increase in carbon emissions during the past few years came as a shock to both China and the international community. The exceedingly high energy and carbon intensities of the Chinese economy provides room for improvement. Emissions growth could slow considerably if the investment in/roll out of renewables continues, if China's determination to improve energy intensities strengthens, and if the expansion in heavy industry slows.

China must continue to demonstrate political commitment to tackle climate change

If China maintains a high energy intensity as its per capita income grows, the country will approach a combination of CO₂ emissions and income per capita similar to that of Middle Eastern oil producing countries. Developing along such trajectories would make any global attempt to control atmospheric GHG concentrations futile. Current policies focus on getting back to a development path with growing wealth and falling energy intensity. Policies have so far been very successful, and if targets are met China would in 2010 alone avoid emitting as much as 1.5 billion tonnes of CO₂.

China must urgently commit to further mitigation options

Embedded in different trajectories for China's future emissions, huge mitigation potential can be found. Future scenarios looking at improvements in line with current policies and improvements beyond current policies, demonstrate the opportunities to move towards a low carbon development pathway with considerably lower growth of emissions. In order to fully realise its potential, China must extend and deepen current policy ambition into further five-year plans.

China should adopt a proactive approach in climate negotiations

With China's increasing emissions and the concurrent loss of negotiation leverage caused by increasing emissions, the coming decade becomes a strategic window for China to balance opportunities and risks in the climate negotiations. The planned massive domestic infrastructure development and investment over the same period can provide either a platform for low carbon growth or lock China into a network of energy intensive infrastructure.

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