

11. Sustainable Development

ECON 211, Winter 2019-20

Yingfeng Xu

January 2, 2020

Topics

Contents

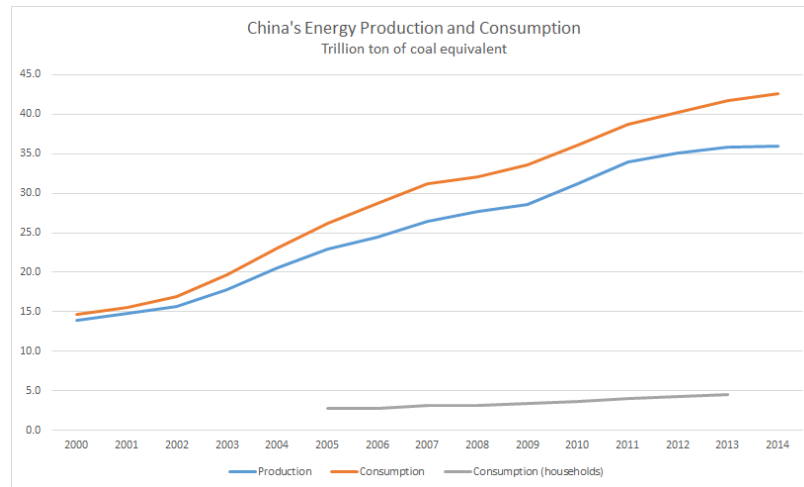
1	Energy	1
2	Environment	12
3	Current issues	14

1 Energy

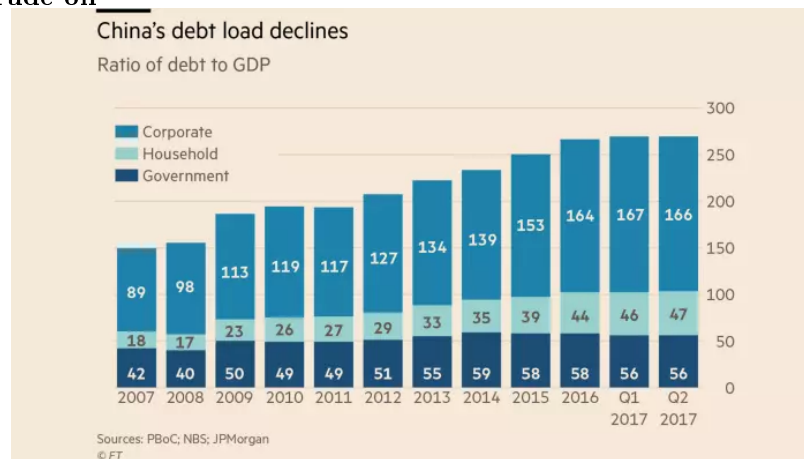
Sustainability of China's economic growth

- The constraint of China's global responsibility: CO₂ emissions are the primary cause for global warming.
- China is the second largest emitter and will soon be the largest emitter.
- China's energy use far exceeds its production.
- China's economic growth is bumping up against the energy constraint.
- China's economic growth has been very dirty.

Energy use in China

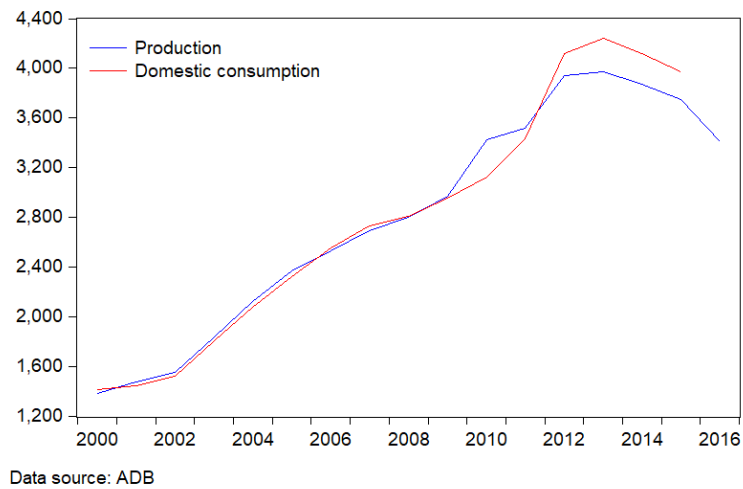


Crude oil



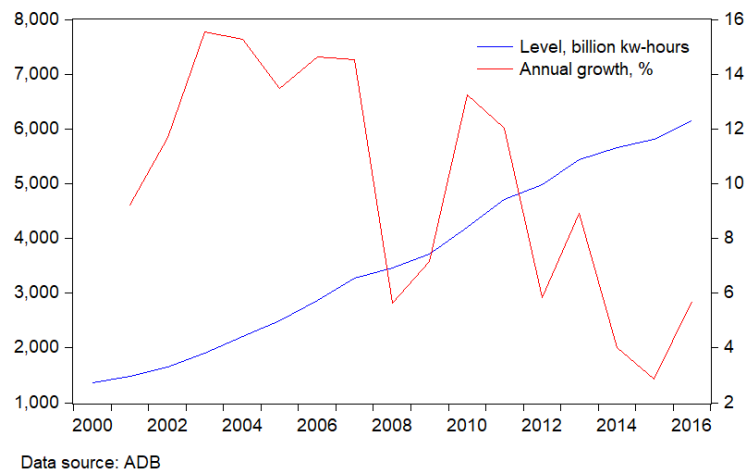
Coal

Coal, China, million metric tons



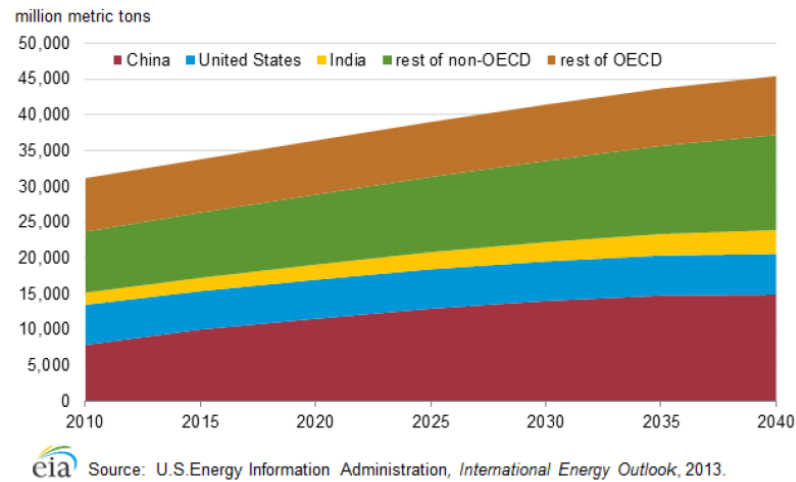
Electricity Production, China

Electricity Production, China



CO2 emissions of major economies

Global energy-related carbon dioxide emissions



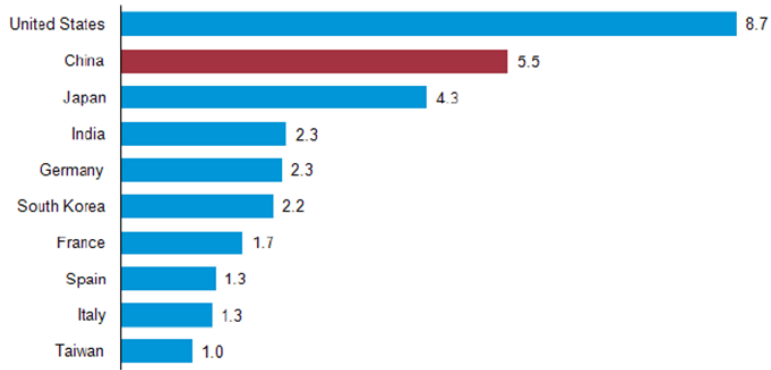
China's CO₂ emissions

- CO₂ emissions are driven by two major factors.
- One factor is total energy use.
 - China's economic growth has been very energy-intensive.
 - China is now the most important driver in global oil market.
- The other factor is energy composition.
 - Coal is the dirtiest kind of energy,
 - but accounts for close to 2/3 of China's energy use

Top 10 net oil importers

Top ten net oil importers, 2011*

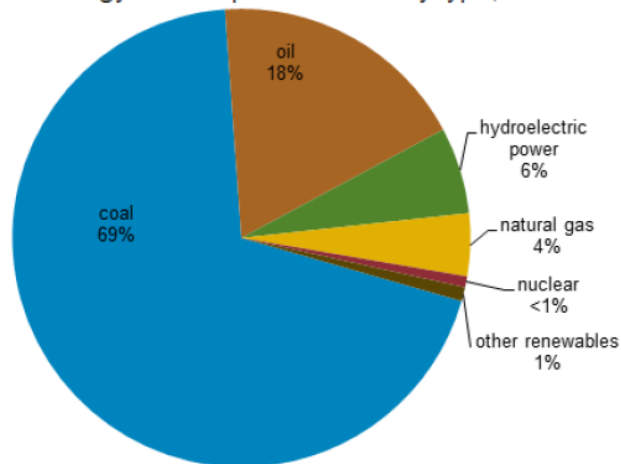
million barrels per day



*Estimates of total production less consumption. Does not account for stockbuild.
Source: U.S. Energy Information Administration *Short-Term Energy Outlook* (August 2012)

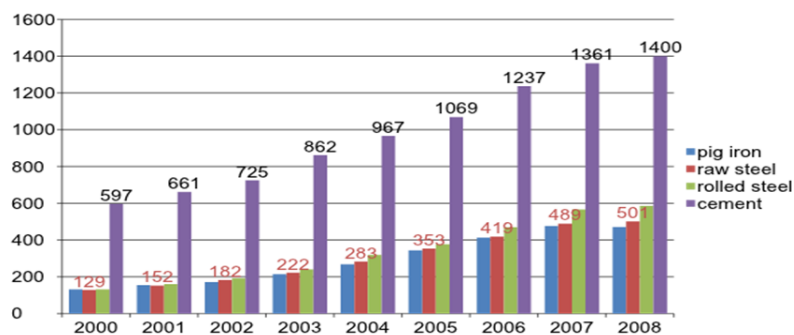
The composition of energy consumption

Total energy consumption in China by type, 2011



Note: Numbers may not add due to rounding.
Source: U.S. Energy Information Administration *International Energy Statistics*.

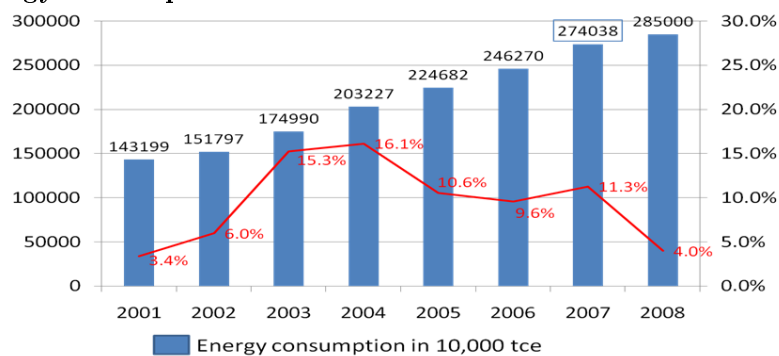
Energy-intensive production



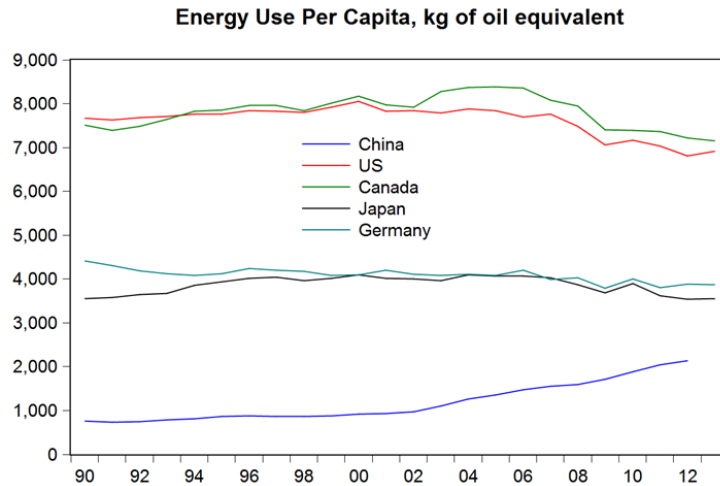
Household demand for energy

- Housing remains the priority in rural area
- Housing and real estates in urban area become one of focuses of investment
- Family appliances popularized
- 9.4 million automobiles sold in 2008, and 13 millions this year

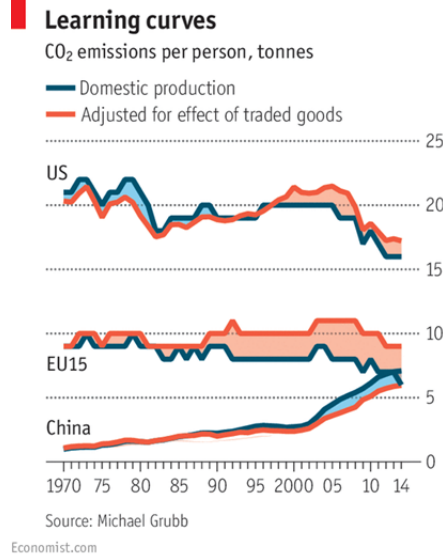
Energy consumption



International comparison



Learning curve



Industry dominates energy use

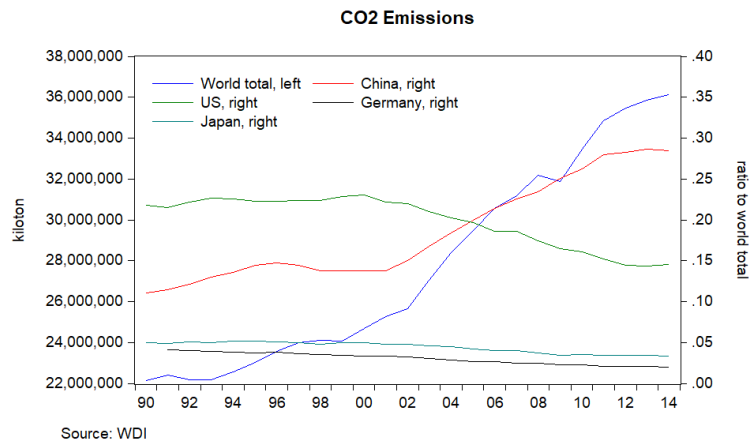
- 70% of primary energy consumed by industry, with residential use only above 10%
- Energy intensive sectors consume about 50%
- More than 75% of electricity consumed by industry

- Metallurgy, chemistry, building material, petroleum chemicals, consume about one third of power
- 90% of primary energy supplied by domestic production

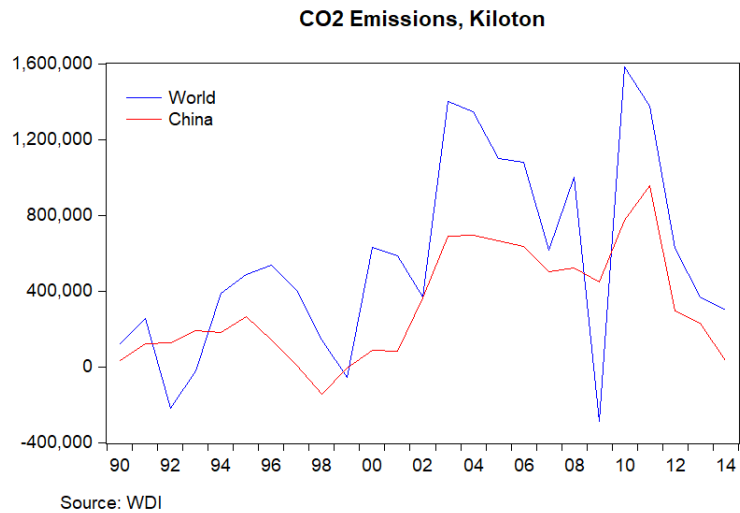
China's growth model

- Polluting and energy-intensive export production
- Construction of railway, highway and airports
- Urban construction and buildings
- Coal, steel, aluminium and cement production
- Idle export factories, under-utilized infrastructure, and empty houses and ghost towns
- Unconsumable GDP, excessive energy usage and emissions

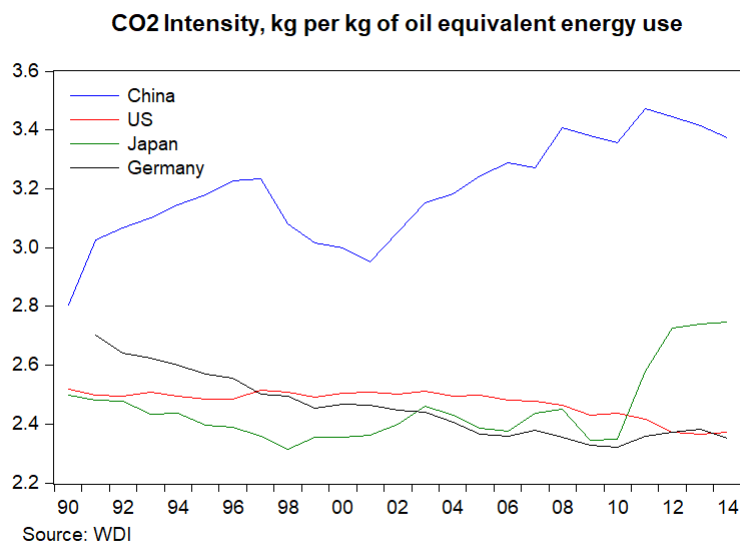
China's CO₂ emissions in a global perspective



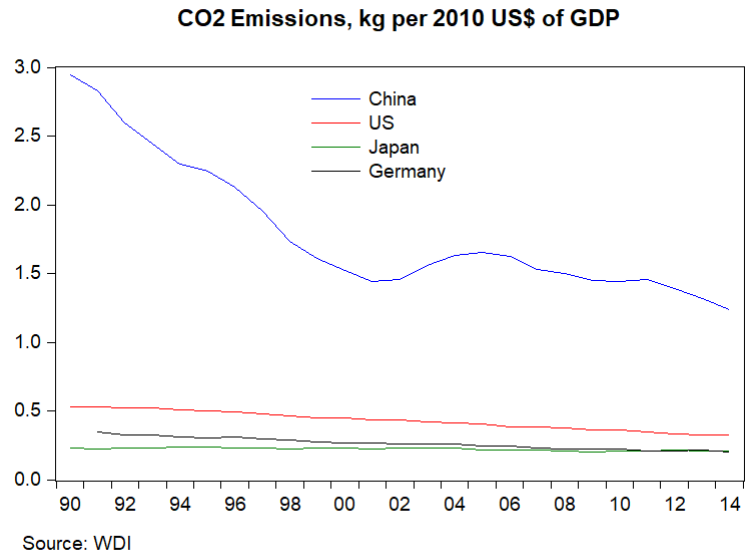
Annual increment in CO₂ emissions



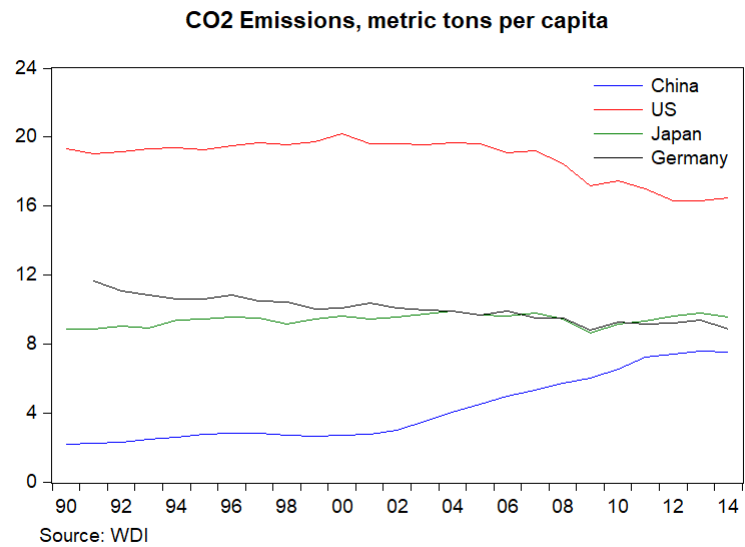
CO2 emissions intensity



CO2 emissions (kg per 2010 US\$ of GDP)



CO2 emissions (metric tons per capita)



China's CO₂ emissions in a global perspective

- Being a global factory, the emissions in China should not be all counted

as China's

- So an adjustment needs to be made for fairness
- The US and Canada are still the highest emitter per capita
- China's emissions has already reached Europe's level, and on a trajectory, which is not sustainable

The restructuring challenge

- External demand will grow more slowly than in the past
- The peak of China's infrastructure construction is likely to be over
- China has committed itself to shoulder its global responsibility to cut CO₂ emissions
- China is looking for new sources of economic growth from urbanization and industrial upgrading
- Recently, China has launched the Belt and Road initiative to expand infrastructure construction in other Asian economies

How to improve energy efficiency

- Downsize energy-intensive output such as steel, cement and aluminum
- Expand less energy-intensive activities such as services and web-based economy
- More energy efficient buildings
- Change lifestyle and drive less
- Enhance the price incentive such as cap and trade for energy conservation

Key points

- China has become the biggest user of energy and the biggest emitter of CO₂
- China accounts for 60% of the world total CO₂ emissions between 2000 and 2014
- Compared with advanced economies, China emits more CO₂ (40% more) per unit of energy used
- For each \$ (2010) income generated, China emits three time more CO₂ than advanced economies
- A substantial part of China's GDP is not consumable, because infrastructure is idle, houses and buildings are unoccupied, and factories have overcapacity

2 Environment

Environmental challenge

- A big part of China, especially large cities, has been covered by heavy smog and air quality is poor
- China is running short of clean water (the share of below class V: 20.7% for national average; 49.9% for Liao; 52.5% for Hai; 48.9% for Huai)
- Partly, this is due to climate change that has led to drying in the North, and partly it is due to pollution

Environmental Kuznets curve

- The environmental Kuznets curve describes an empirical pattern that pollution tends to rise in the early stage of economic development and gets contained and controlled as a country reaches the middle income level
- The mechanism:
 - Technology: from crude to refined
 - Awareness and preference: from income to quality of life

Government initiatives

- Environment agency has just been elevated to the ministry level from the bureau level
- The power of NEPA has gained steadily
- Increasingly, environmental impact has become a decisive factor for approving investment projects
- The government has forced closure of numerous small factories that pollute heavily
- Public awareness for environment has been roused

Air pollution

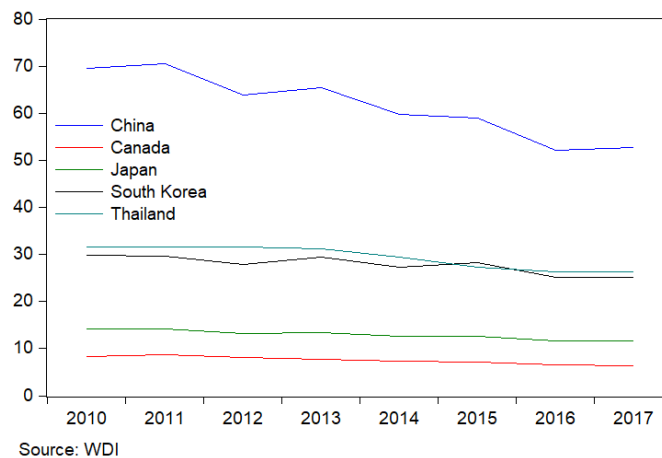
- coal burning
 - especially unfiltered in rural areas: 70% smoke and dust, 92% sulfur dioxide
 - by 2020, 100 million tons per year
- car smog
 - rapid growth
 - if every Chinese family 2-car family, 600 million cars

Costs of environmental damages

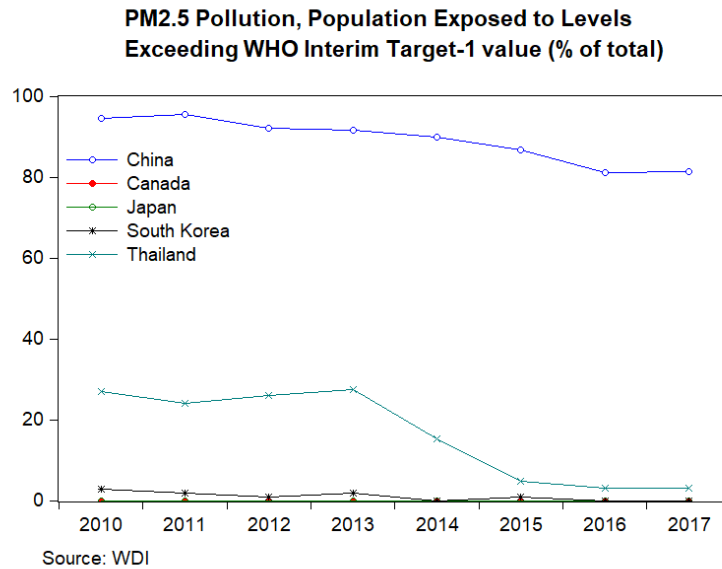
- A World Bank study (1997) estimates \$54 billion a year, or 8% of GDP
- The biggest element, \$20 billion, is the cost of health and productivity losses
- A major cause for industrial pollution is the heavy reliance on scattered small-scaled low tech factories
- Therefore, a fundamental solution lies in a new geography of industrial production that is concentrated and operates at large scale with better technology

Air pollution

PM2.5 Air Pollution, mean annual exposure (micrograms per cubic meter)



PM2.5 pollution, population exposed to levels exceeding WHO Interim Target-1 value (% of total)



Key points

- Fast economic growth has severely degraded China's environment
- China's air quality is well below what is acceptable for healthy living
- Much water is unsuited for drinking
- When the costs of environmental degradation is subtracted from the GDP generated, the growth miracle evaporates

3 Current issues

What should the government do?

- China just passed the toughest environmental protection law last year
- But it is not adequate just to have the law on paper, enforcing it is the key
- GDP growth should be played down as a performance criterion for government officials
- Legal suits by a third party should be encouraged

What structural adjustments are essential?

- Less but cleaner coal, and more clean and renewable energy
- Low-end export production should be scaled down
- Urban development needs to be smarter and more energy-efficient
- Mass transit system in large cities should be given priority to discourage the use of private cars
- However, digesting high debt related to industries with excess capacity and empty cities needs to be handled with care

What is the role of the market?

- The cap and trade system is a market-friendly way to reduce emissions
- Taxes and subsidies should be used to encourage the use of clean energy and penalize energy waste
- A carbon tax is also a useful way to encourage energy efficiency
- The net outcome should raise the effective cost of energy use and environment pollution

What is in the 13th five-year plan?

- It has 7 chapters on region classification by function, resource use efficiency, environment protection, protecting ecological system, low carbon, green development
- Green development can serve as a new growth engine, however, the price of the goods made in China would rise unavoidably
- Many traditional exports would become noncompetitive
- The vision is good, but how it will be implemented is another question, especially when enterprises all complain about low profits and high costs

Key points

- The importance and urgency of pushing for a green growth model is widely known and accepted by the CCP
- But the CCP does not appear to be willing to accept a much lower GDP growth
- It is not clear how much the performance of environmental protection weighs in career promotion for party/government officials
- The market friendly approach may not be very effective in dealing with local governments and SOEs

Review questions

- How much does China consume energy and other resources, relative to other countries?
- How heavy has China increased its reliance on imports of energy and other resources?
- How serious is China's environmental challenge? How has China responded to the environmental challenge?