

GRAPH 1:  
China leads in decoupling energy  
from GDP growth

ANNUAL REPORT ESSAY

As global climate change and rising demands for oil, natural gas, and coal resources attract growing world-wide attention, China’s new influence raises growing speculation and concern. The rapid pace of China’s economic growth staggers the world’s imagination, and its rising significance as an environmental actor magnifies the stakes in managing a massive global transition towards sustainable growth.

The world’s most developed nations are grappling with the urgent challenges posed by climate change. Many have developed policies to dramatically reduce the greenhouse gas emissions their economies produce. Yet critics wonder whether such changes can really matter unless China also commits itself to a parallel and equally aggressive strategy to reduce its carbon footprint.

What is less well understood is the dramatic progress China is already making, quietly, even as its economy roars along. Though it still remains by any measure a developing nation, Chinese officials have moved with impressive speed to acknowledge the nation’s energy challenges and put in place new programs to slow the pace of its energy growth and carbon emissions.

Understanding the challenges China faces requires acknowledging not only the unprecedented nature of China’s economic transformation in the last three decades but also the immense dimensions of the canvass on which this saga has been playing out.

CHINA’S TRANSFORMATION

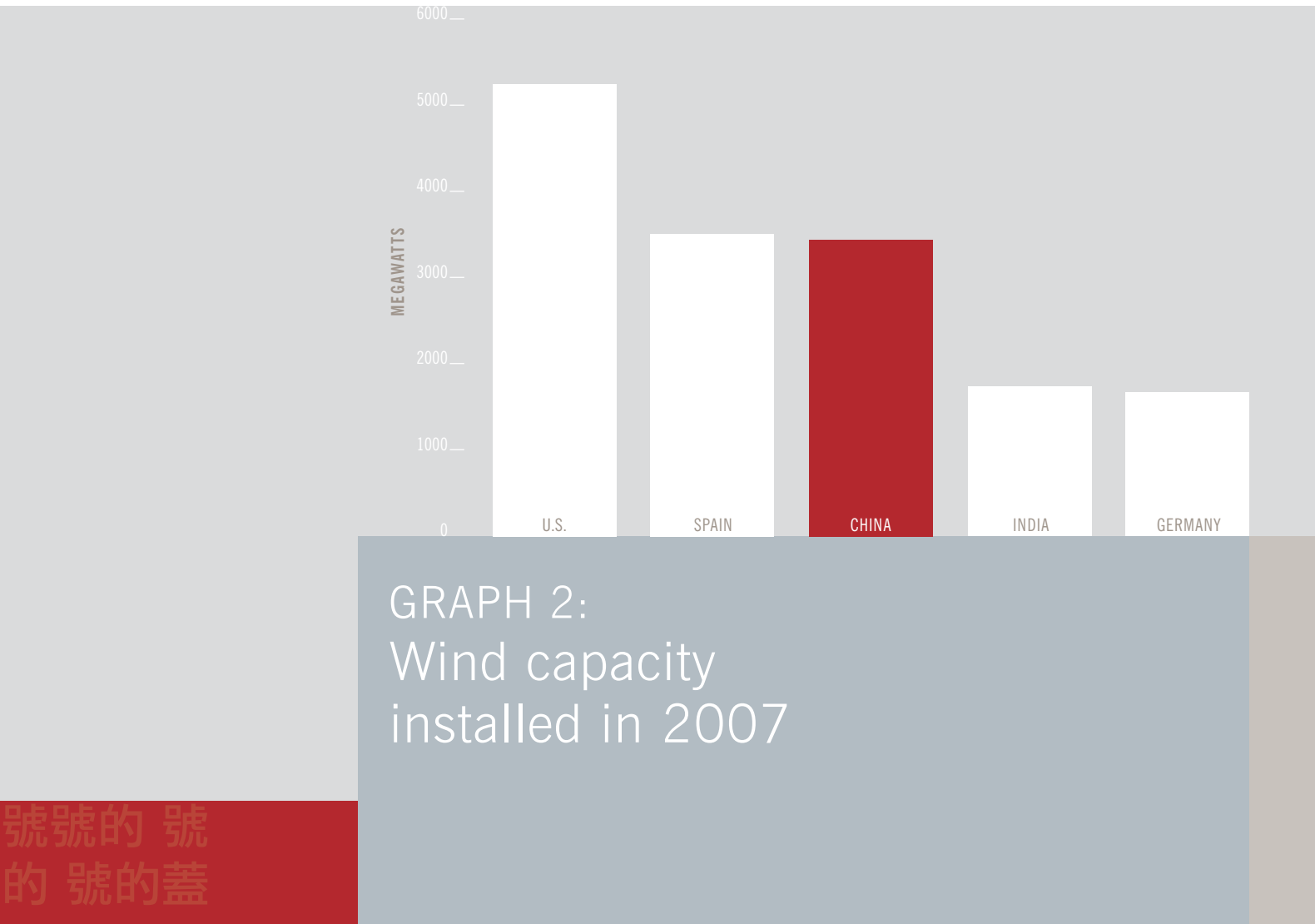
A land containing four times the population of the United States, China has a robust economy that consistently expands by ten percent each year, more than triple the pace of the U.S. and European economies. In a little more than two decades, a population nearly equal to that of the entire United States — some 300 million people — has risen from poverty to middle-class economic status. Another 300 million loom just behind them, eagerly awaiting their turn to move up the economic ladder.

As China’s leaders cede greater control over the economy to private entrepreneurs and to the opportunities they see being created by the marketplace, major flows of investment and technology from abroad have given China the capabilities and resources to emerge as the world’s single largest factory floor. Combining advanced

technology with limitless supplies of labor, China’s exports to the world already exceed \$1 trillion per year. Toys and textiles, cameras and computers, China is now among the world’s top producers in these and hundreds of others of goods.

This colossal increase in industrial production has not only made jobs available to millions of young Chinese streaming out of rural China to work in its factories, it has significantly benefited the world’s consumers. China’s growing manufacturing sector has lowered prices for manufactured goods and, until recently, dampened inflation. Yet the robust expansion of China’s manufacturing economy and its rising share of international trade, which is in large part driven by international investors, has also increased China’s need for capital equipment, raw materials, and especially, energy. Today for example, China consumes more than 31





percent of the world’s steel and even higher percentages of iron ore and coal. It has become the largest market for cell phones, fertilizer, grain, and coal. China puts two new power plants on line each week. Yet electricity consumption per capita is still very low, and periodic power shortages in selected areas across China remain commonplace.

This rapid growth has transformed China into the world’s second largest user of oil after the United States, requiring more than seven million barrels of oil per day (mb/d). By 2020, that demand is forecast to exceed 16 mb/d per day.

Rather abruptly, the world is being forced to discover how to accommodate China’s accelerating economic engine — an engine it helped design, engineer and construct. After all, roughly one-third of the total energy

consumed in China is used to produce the goods that are then exported to wealthier consumers around the globe. Thus a significant amount of the pollution and carbon dioxide being put into the air by Chinese factories today represents emissions that once were generated by factories located in Pittsburgh, Gary, and Toledo, as well as in Germany’s Ruhr Valley.

So as China rushes to re-enact the industrial revolution that led the West to wealth, the challenge today is for China to find a way forward in a carbon-constrained world. Rather than simply follow the path of 20th century development, China will have to break a new path of development that ensures its growth is cleaner, uses energy more efficiently, and produces less carbon dioxide.

#### CHINA'S NEW CLEAN ENERGY POLICIES

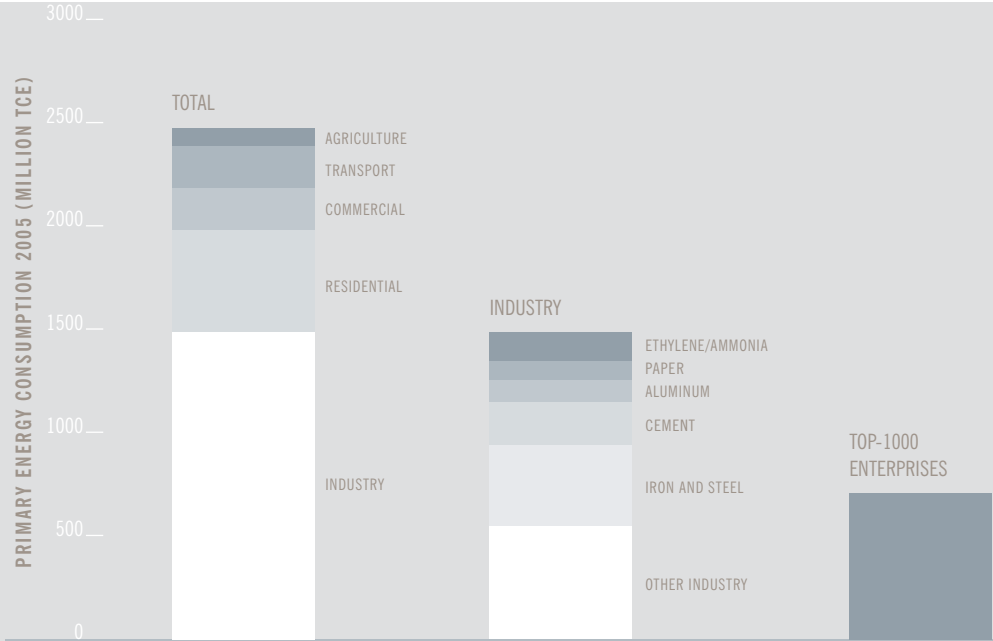
China’s remarkable requirements for new sources of energy and raw materials sometimes masks the fact that the Beijing government has already put into place a suite of programmatic clean energy policies, that translate into the world’s most ambitious target for cutting emissions of carbon dioxide.

For example:

- ★ China has established a renewable energy law that mandates that by 2020, fifteen percent of the nation’s energy supplies will come from wind, biomass, solar and small hydropower. Since 2006, the year China issued this renewable energy law, installation of wind power facilities actually quadrupled, and today advanced design windmill projects are readily visible in places like the vast Gobi Desert in western Xinjiang province. By the end of 2007, China had already

met its 2010 target for wind power development, a full three years ahead of schedule.

- ★ China has set a goal of reducing its energy intensity by twenty percent between 2005 and 2010. By 2010 China hopes to reduce by 1.5 billion tons of CO<sub>2</sub>, a target five times as ambitious as the plan announced by the European Union under the Kyoto Protocol and almost ten times more aggressive than the goals announced by the State of California, the most rigorous of U.S. goals.
- ★ It has also targeted for special scrutiny the nation’s largest industrial plants, dominated by state-owned enterprises. The nation’s largest 1,000 enterprises, which collectively consume one-third of the nation’s total energy, have all signed on and committed themselves to reduce their energy use. This program



GRAPH 3:  
Energy consumption  
of China's top 1000 enterprises

四、五  
號的塑  
膠容器  
及相關

alone will reduce China's greenhouse gas emissions by 250 million tons a year by 2010.

- ★ China has also established extensive new efficiency standards for consumer home appliances such as refrigerators and clothes washers, as well as energy codes for commercial and residential buildings.
- ★ The rapid pace of automotive sales in China and the accompanying rise in oil consumption have also masked the fact that the nation has proven itself more aggressive than the United States when it comes to demanding higher fuel efficiency for its automobiles. The U.S. Congress recently passed new rules that will mandate American automakers raise average fleet mileage to 35 miles per gallon in 2020. In 2008, Chinese cars already have to meet a 36 miles per gallon standard.

Taken together, these measures make China a clear leader in formulating sustainable energy policies — certainly among the developing nations, if not the world. Yet despite these significant achievements, and the recognition by the central government that China needs to search for a more energy and resource-efficient development path under the rubric of the “scientific development perspective,” it is unrealistic to expect a populous nation still in the early stage of industrialization such as China to reduce in absolute terms its carbon footprint in the near future.

#### CHINA'S ENERGY CHALLENGES

Today China's per capita energy use remains only one-eighth the level consumed by Americans and one-quarter the usage of residents of the European Union. And from a historical perspective, China's cumulative contribution of carbon dioxide since 1750 has equaled only 8.2 percent of the world's total, while the United States produced an estimated 27.5 percent of total CO<sub>2</sub> now in the global atmosphere.

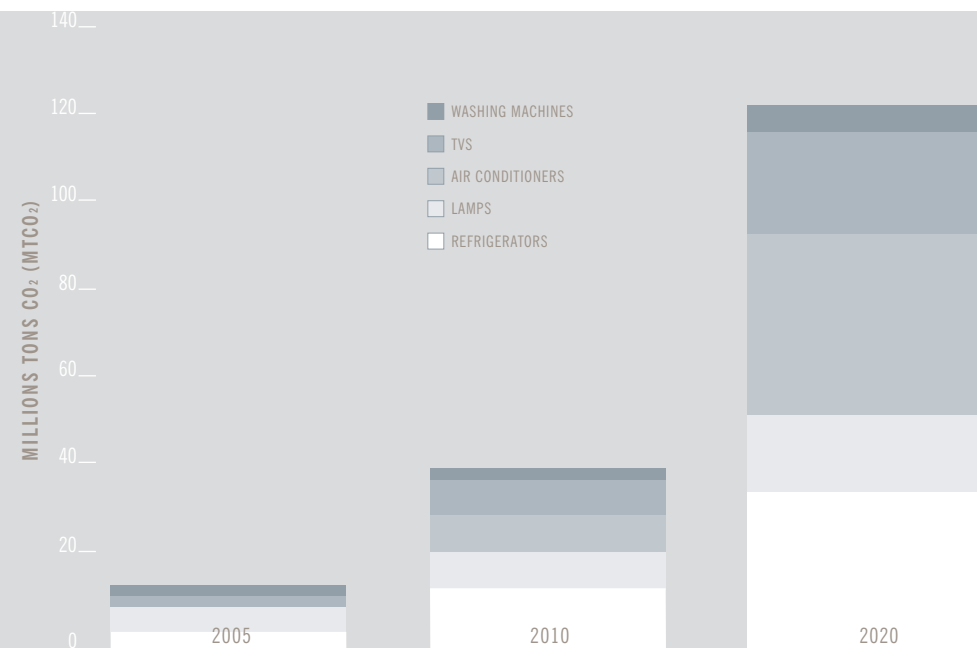
As millions of Chinese peasants migrate to large cities in the coming decades, however, per capita energy consumption could easily double or triple, since the footprint of China's energy use is directly correlated to the delivery of basic services such as lighting, refrigeration, air-conditioning, and the power needed to run the factories that make all the products Americans and

Europeans avidly consume. Rising income is also fueling the sale of automobiles in China, and by 2020, China may well have 140 million cars on the road.

So the consequences should China, and the rest of the developing world, simply following the traditional path of industrialization and modernization would be truly and literally breath-taking. If every one of China's 1.3 billion people were to consume as much energy as Americans do today, China's carbon dioxide emissions in 2020 would be 22 percent higher than what the entire world currently produces.

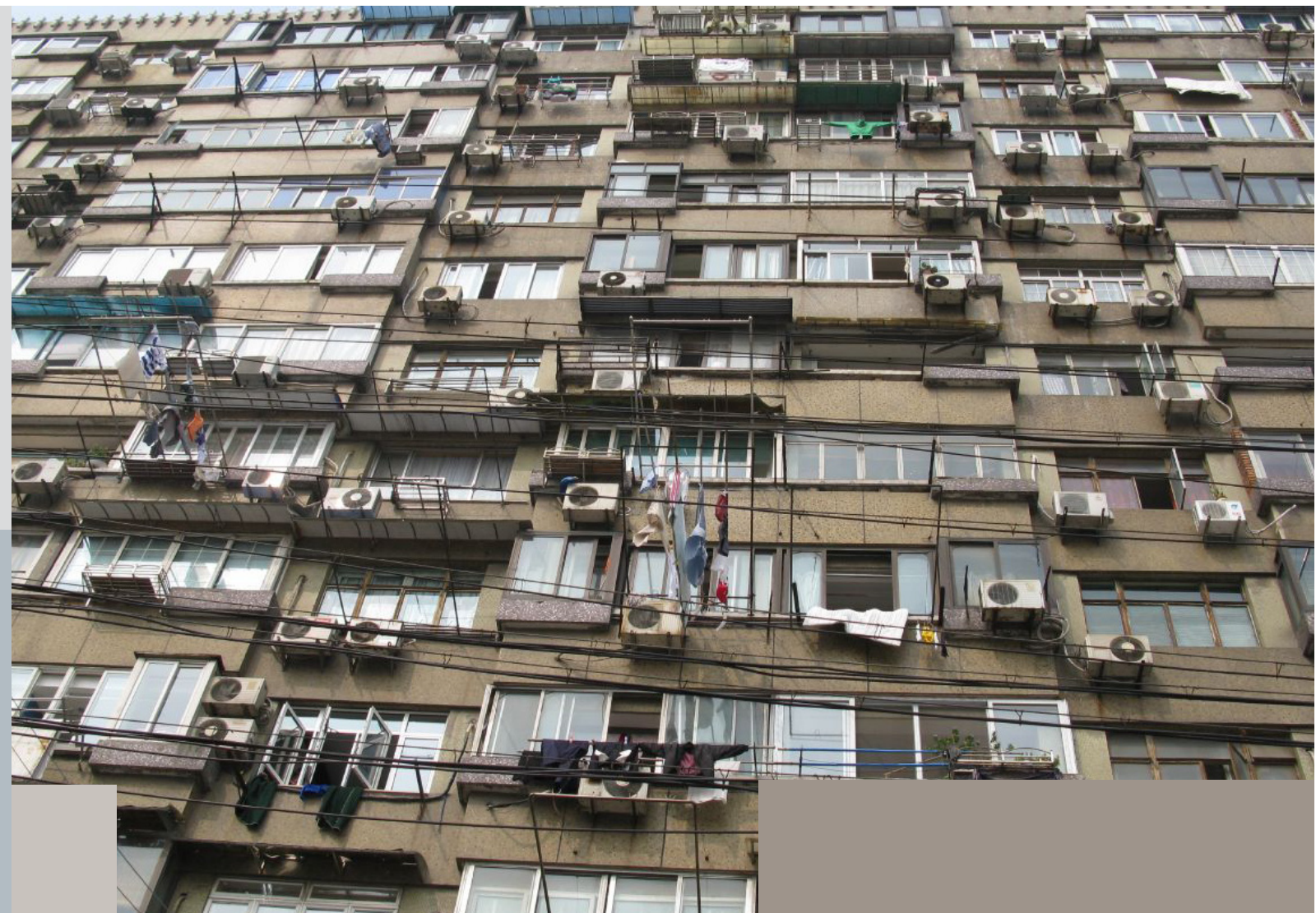
As the world begins to comprehend the unprecedented energy challenges that confront China, China's own leaders have begun to confront a new challenge: tapering off of its energy efficiency gains. For some twenty years, China





GRAPH 4:  
Energy savings from China's  
new appliance standards

號的塑號的蓋



consistently demonstrated a record of steady improvement in its energy efficiency. From 1980 to 2000, China's economic activity grew twice as fast as its energy consumption. This was a remarkable achievement, considering that it is more typical in most developing countries that energy grew faster economic activities.

But now that impressive rate of progress has begun to flatten out, as the composition of the nation's investment pattern has changed. A surge of new investments in heavy industries like steel, aluminum and chemical manufacturing to support China's urbanization and infrastructure development, as well as exports of consumer products to the world, has created enormous demand for new energy sources. This helps explain why China added 90 gigawatts of electrical generation capacity in 2007, the third year in a row in which the

nation increased its power output by more than the total generating capacity of Great Britain.

The concern is that without deeper levels of investments in energy efficiency, China's energy intensity would level off. Steel and aluminum works, chemical manufacturing and other energy-intensive heavy industries will likely continue to replace subsistence agriculture as the most significant engines driving China's accelerating growth. Likewise, Chinese peasants will continue to stream out of rural regions to big cities, and further push up demand for the steel, cement, and other industrial products needed to build the high-rise apartments and urban infrastructure projects this population will require. Amid lucrative opportunities for rapid-fire growth and wealth accumulation, there is also concern that government incentives for improving long-term energy efficiency may seem less attractive.

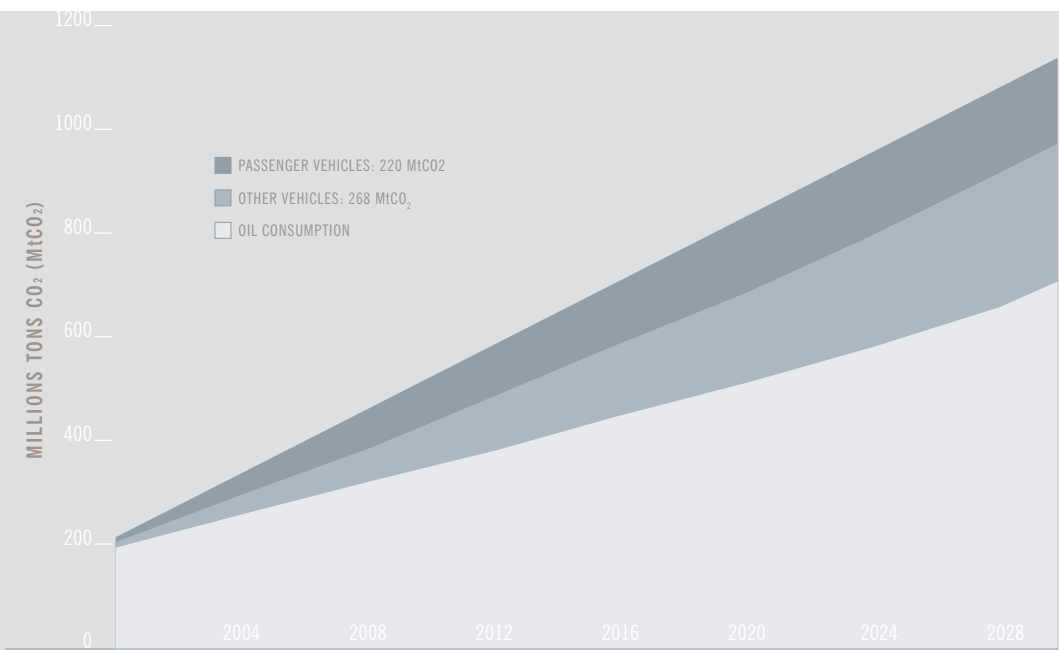
#### THE ROLE OF COAL

Coal continues to supply 70 percent of China's total energy needs, and this reliance is not likely to change in the short-term because Chinese coal is cheap and abundant, despite its negative impact on air quality, human health, and climate change. In an age when concern over CO<sub>2</sub> emissions is growing around the world, the fact that China's coal use has nearly doubled since 1996 naturally triggers global concern. The International Energy Agency, which predicted as recently as a few years ago that China's carbon emissions would not reach those of the United States until 2020, now thinks China has already taken the lead.

Yet even if it were feasible for China to immediately replace coal as a primary energy source and dramatically increase its reliance on oil and natural gas, the pressure on global energy markets would likely drive world

prices even higher than they are today. It is clear that greater investment is urgently needed to help China develop cost-effective methods to use coal more cleanly, through, for example, integrated gasification and combined cycle (IGCC) and carbon capture and storage (CCS).





GRAPH 5:  
Carbon savings in  
China's vehicle fleet

四、五號的塑  
膠容器及塑膠

#### A GLOBAL TRAILBLAZER?

The challenges China faces today are daunting.

Never before has a nation starting off from such a low level of development ever attempted to modernize so quickly even as it is being asked to make fundamental changes in its growth strategy to accommodate the globe's looming environmental challenges. There is no precedent to follow. There are no leaders to copy, few "off the shelf" technologies to appropriate. Instead, China will by historical circumstances be forced to become a global trailblazer at the frontiers of sustainable development.

Encouragingly, China has recognized that it can no longer follow the traditional "development first, environmental protection later" approach, and with significant assistance from outside, is seeking pragmatic

solutions that will allow it to continue to develop in a manner that is both resource-efficient and more environmentally friendly.

These measures include stricter enforcement of energy codes for new buildings; tighter efficiency standards for appliances; further strengthening of fuel economy standards for motor vehicles; investment in mass transit alternatives to private vehicles; green-design principles for new cities; development of renewable energy sources; and technologies that would capture and store carbon dioxide from coal.

To succeed, such policies will require strong new incentives as well as stiff penalties to force compliance. Ironically, China's shift away from a centrally-planned economy has seriously diluted the effectiveness of central government mandates, especially those on

energy efficiency and environment. A temptation to "get rich quick" challenges enforcement regimens in such a large and diverse nation where implementing national goals at the local or provincial level can often prove difficult.

In a society where the "rule of law" remains weak, strengthening the institutional capacity of relevant regulatory agencies, which are seriously understaffed and under-financed in relation to the scale of energy and environmental challenges confronting China today, will remain a top priority for those hoping to improve energy efficiency and environmental protection in China. So will nurturing local technical experts to develop engineering solutions, and leaders who can help communicate the stakes to a population that still aspires to the sort of middle-class existence Americans and Europeans now enjoy.

The world has a stake in China's success in finding a sustainable development path. In the interdependent world in which we live today, our futures are intrinsically connected. It is in our common interest that we assist in China's transition. In casting for new and unexpected solutions to these imposing challenges, China may well develop their own suite of innovative policies and technologies that could benefit the world.

More than simply a technological fix, this long-term effort will require China to find thinkers and strategists who can mobilize a series of adaptive solutions, as well as significant outside investments to help build capacity and institutions to implement forward-thinking solutions.

In this we can hope that China may someday lead the world.