



“Summary of article by John Byrne, Bo Shen, and Xiuguo Li: Balancing China’s Energy, Economic and Environmental Goals” in Frontier Issues in Economic Thought, Volume 6: A Survey of Sustainable Development. Island Press: Washington DC, 2001. pp. 205-208

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China’s economy has expanded rapidly, with annual growth of real GNP exceeding 9% throughout the 1980s. As a result there has been a rapid increase in energy use, largely relying on coal, the country’s most abundant fuel. Combustion of coal has caused severe environmental degradation, particularly in urban areas; the problems will only worsen if the same style of growth continues. This article suggests that an alternative energy path emphasizing energy efficiency and renewable energy development is in China’s long-term economic and environmental interest.

Energy, Environment, and Development

Economic growth in developing countries is typically energy-intensive. China is no exception: from 1980 to 1991, China’s per capita energy consumption grew by 3.8% annually, compared to less than 0.8% annual growth worldwide. Chinese industry is particularly energy-hungry, requiring three to four times as much energy input per unit of output as industry in developed countries. Energy-intensive economic growth often leads to mounting air pollution problems; in China, these problems are particularly serious because three-fourths of all commercial energy comes from coal.

In one respect, China’s energy intensity is no surprise. The country’s industry is concentrated in processing raw materials and producing infrastructure and durable goods, all of which are highly energy intensive activities. The developed countries, which are now comparatively energy efficient, historically had rapid increases in energy intensity as they moved through the early stages of industrialization, followed much later by decreases (i.e., efficiency gains). But there are both economic and environmental obstacles to countries like China taking the same path today.

The globalization of markets is far more significant for countries industrializing today than it was for countries that industrialized earlier. China’s energy-intensive industries, such as chemicals and steel, are forced to compete with more energy-efficient producers in other countries. Chinese producers may find themselves at a competitive disadvantage due to their high energy costs.

Moreover, there is not enough coal in China to continue energy-intensive growth indefinitely. While the country's total supply is large, China's per capita coal reserves are only two-thirds of the world average; China's proved recoverable coal reserves per capita are only half the global level. Thus energy efficiency and diversification of supply will be essential for continued growth.

In the developed countries, economic growth is becoming delinked from energy use. Energy intensity in high-income countries is low, and has declined steadily since the oil crises of the 1970s. In China, in contrast, the ratio of energy use to GDP rose until 1978, followed by a modest decline as new policies began to promote energy efficiency. Much more, however, will need to be done in the future.

Coal combustion has led to high levels of air pollution in Chinese cities. Much of the coal has very high sulfur content, and often it is not sorted or washed before burning, which only adds to the problems. Levels of both suspended particulates and sulfur dioxide are far above World Health Organization standards for healthy air. Among the world's large cities, five of the ten with the highest particulate levels are in China, as are three of the ten with the highest sulfur levels. Urban air pollution is worst in winter and spring, when coal is burned for heat as well as in industry and electric power plants. Sulfur emissions create another environmental threat, acid rain, which is now a problem in rural as well as urban areas.

The Potential of Energy Efficiency and Renewables

Promotion of energy efficiency began in the Sixth and Seventh Five-Year Plans (1981-85 and 1986-90). As in developed countries, investment in energy conservation is often more cost-effective than investment in new energy supplies. More than a billion dollars was invested in energy efficiency under the Sixth Five-Year Plan, saving energy at less than three-fourths of the cost of new supplies. However, this made only a small dent in China's energy system as a whole. Energy use remains highly inefficient, and there are still many opportunities for cost effective investments in efficiency.

China also has a number of renewable energy alternatives. The nation's geothermal reserves are equivalent to 3 billion tons of coal, only 0.01% of which is being used. China's wind power potential is estimated at 1600 GW, or eight times current total electricity generation. At least in some regions, tapping this resource could provide users with relatively low cost power without adverse environmental impacts. China also has strong prospects for photovoltaic power, with high levels of solar radiation in most parts of the country. Photovoltaics can bring electricity to some remote agricultural areas at a lower cost than extension of the conventional power grid.

Renewable energy sources have two important economic advantages. First, they reduce the risk of future fuel price variability, since they do not depend on fossil fuels. Second, economies of scale are generally much less significant for renewables than for conventional energy sources. This allows modular, small-scale expansion of energy supply when and where it is needed.

Equally important are the environmental benefits of energy efficiency and renewables. Just as energy efficiency is more economical than new supplies in meeting energy needs, it can also

provide pollution reduction at a lower cost than retrofitting existing power plants. Analyses conducted in the U.S. have found that investment in high efficiency refrigerators and lighting can reduce sulfur emissions from coal-burning power plants far more cheaply than emission controls.

In China, retrofitting the numerous coal-burning facilities with emission controls is an urgent environmental priority, but investment in efficiency and renewables can provide complementary benefits at a lower cost. If China used 3% of its wind power potential for electricity generation, it could reduce its annual sulfur emissions by more than 20%. Thus greater use of renewables can offer sizeable environmental advantages to China.

Policies for Developing Energy Efficiency and Renewables

To enable energy efficiency and renewables to compete on a level playing field, China needs to reform several features of its institutional and economic structures. National energy planning should set goals and timetables for increasing the use of renewable resources in areas where grid extension is too costly. The country also needs to create or strengthen national and provincial institutions that promote energy efficiency and renewables, and should encourage government-industry partnerships in this area.

Specific regulatory measures are needed, including comprehensive national air quality standards and energy efficiency codes. Changes in economic incentives should include a phase-out of government subsidies for fossil fuels, evaluation of unconventional energy resources based on avoided costs, utility rebates for investment in efficiency and renewables, cost-based electricity pricing, and favorable tax treatment for energy equipment expenditures.

Along with such incentives, market transformation strategies could encourage more rapid development of efficiency and renewables. Provincial and local governments could adopt renewable energy set asides, establishing targets for increased use of renewables. Policy collaboratives involving governments, industry, community and research organizations could identify local opportunities for the growth of energy efficiency and renewables markets.

Finally, China could enhance its cooperation with the international community, seeking capacity building and institutional support in energy and the environment from the World Bank, the United Nations, and other multilateral organizations. China should work with developed countries to transfer energy efficiency and renewables technologies, and should participate in worldwide information exchanges in this area.

Economic development is now and will remain a dominant goal for China. However, it is possible to achieve the country's goals in a sustainable way. Pursuing an alternative energy path emphasizing efficiency and renewables can be in China's long-term economic and environmental interest... China can move quickly in this direction because it can invest in efficiency and renewability from the outset, rather than having to rebuild its energy system as industrial countries must do. [461]