Center for American Progress

China's Clean Energy Push

Evaluating the Implications for American Competitiveness

June 21, 2010, Russell Senate Office Building, Room 385, 4:00 p.m. to 5:15 p.m.

Fresh from releasing "Out of the Running?," a report that compares clean energy investments in China, Germany, and Spain, senior staff from the Center for American Progress brought a select group of Senate staffers to visit China in April to meet with policymakers, academics, and companies to better understand China's clean energy economic development strategy. The visit provided convincing evidence to those involved that China has made large-scale investments in clean energy manufacturing and infrastructure, and that these signal China's clear desire to lead the world in clean energy technology production, deployment, and eventually innovation. It also underscored the need for the United States to move aggressively to articulate our own clean energy strategy—one that builds on our historic strengths in innovation, entrepreneurship, and high-value added manufacturing.

This fact sheet summarizes some of the group's impressions and findings about the state of clean energy innovation and manufacturing in China:

Market creation. Stable, long-term policies for promoting clean energy demand are key to spurring investment in innovation, manufacturing, and deployment activities in China. The country's national targets for renewable electricity (15 percent of primary energy from nonfossil fuels by 2020) and energy efficiency (20 percent decrease in energy intensity from 2006 through 2010) are translated into provincial and local targets, which creates a stable, long-term market signal to attract private capital investment. Local officials are also increasingly being held accountable by basing their promotion prospects at least partially on the fulfillment of these targets.

Infrastructure. China's infrastructure investments are impressive, tangible, and breathtaking, and they're driven by rapid economic growth and urbanization. Large-scale deployment of intercity high-speed passenger rail, intracity subway

systems, and high-voltage grid transmission wires left a particularly deep impression on our group.

China has 54 national high-tech development zones (innovation and manufacturing clusters), many of which focus on energy technologies, on top of dozens of provincial- and university-level clusters. These high-tech clusters create an industrial ecology that optimizes productivity by co-locating different links of the supply chain (including R&D) and factors of production (supply of different components and a skilled work force). Regional governments administer the clusters and provide generous financial incentives such as grants, tax breaks, and discounted land to attract industry.

All of these incentives are provided on top of what is perhaps the most powerful driver for infrastructure investments—cheap capital.

Financial capital. The conventional wisdom is that China's competitiveness in manufacturing and infrastructure investments is fueled by low labor costs and an undervalued currency. But all our conversations with businesspeople convinced us that the ability of state-owned banks to mobilize vast sums of low-cost capital to preferred industries such as clean energy and infrastructure is at least just as important.

Cheap capital may have a downside, however: Our group met with Beijing-based economist Michael Pettis, who is concerned that China is making financial bets that may turn out to be uneconomic and unsustainable in the long run, increasing the risk of bad bank loans.

Human capital. China's vast low-carbon development ambitions will require the skills and talents of many trained workers. As a result, China is investing heavily in its workforce development system. Businesses we met with repeatedly lauded the fact that China is churning out high volumes of technically trained graduates from universities and vocational institutes. But we did not get a strong sense of the country's overall plan to prepare its workforce for the many occupations and sectors that make up the clean energy economy.

Based on what we heard, there is some level of local government support for workforce retraining under the national program of shutting down energy-intensive and pollution-intensive firms. But private renewable energy companies also take it upon themselves to train their workers with industry-specific skills. The

government clearly supports these incumbent worker training programs, and it sometimes provides up to a year of public financial support for businesses to send workers as far away as Germany and the United States to acquire technical skills in the wind and solar industries.

Since our trip, the central government has announced a broad vision for a national talent and workforce development strategy, which will likely result in more concrete government workforce programs at the local levels going forward.

Innovation. While keeping in mind the limited exposure that a week-long stay in China provides, it was our general sense based on the companies and technologies we visited that the United States still maintains an innovation edge over China. A solar PV company we visited, for example, relies completely on foreign technology for the capital equipment of their assembly line, while an electric vehicle manufacturer we spoke to says they import 35 percent of their components from the United States.

China is working to close this gap: The government plans to increase its share of gross domestic product dedicated to R&D from 1.5 percent currently to 2.5 percent by 2020. If China sustains its current pace of public and private investment in all areas of the clean energy value chain—R&D, commercialization, manufacturing, and deployment—many of us believe that the technology gap between both countries will inevitably shrink. In fact, our group came away with the sense that China has perhaps as little as five years to catch up if the United States fails to act further to shore up its competitiveness.

The government officials we met on our trip emphasized the critical role of national R&D grant-making programs and university research in technology innovation. The national, provincial, and university high-tech clusters may also play a important role in commercializing emerging technologies by linking R&D to manufacturing activities. China has also learned the important lesson that innovation can take place on the factory floor as well as it does in the lab. For instance, one major solar PV producer we visited described how engineers are constantly interacting with equipment operators on the factory floor to optimize their assembly line, and they are constantly providing suggested improvements to equipment suppliers.

Looking ahead, China's emerging clean energy sectors may be able to draw lessons from the television and semiconductor sectors: For instance, that cheap capital often causes manufacturers to relocate, leading innovators to then follow

the manufacturing. As cheap manufacturing of cathode-ray tubes led to the United States exiting the market, the subsequent innovations in plasma, LCD, and now LED are all taking place in Korea and Japan. It may be that relocation of clean energy R&D to China, where many suppliers and manufacturers are now located, is the next step.

Perhaps most tellingly, high-profile multinational companies including Applied Materials (capital equipment for solar manufacturing), Novazymes (biofuels), and IBM (high-speed rail software control systems) are already opening major R&D centers in China. We met with Applied Materials representatives in China, who explained to us that proximity to a stable market and customers (Chinese solar manufacturers), and the availability of skilled human capital were key factors in their decisions to locate R&D activities in China.

Energy mix. China is currently heavily reliant on coal and oil for its energy mix. Tsinghua University academics presented modeling to us showing that even under the most optimistic of low-carbon scenarios, coal and oil will account for 55 percent of the country's primary energy mix in 2050. This insight strongly suggests that China must optimize coal and oil use and manage increasing demand through energy efficiency and conservation. These practices will be as important as or even more important than China's efforts in developing renewables, nuclear, and natural gas.

Further research for U.S. policymaking. It was impossible for us to gain a comprehensive understanding of China's clean energy economy in a short five-day trip. We received a good introduction to a broad range of activities in the sector, but further research on the following topics may better inform U.S. policymaking:

- To what extent are subsidized capital and somewhat protected markets actually undermining China's development goals by misallocating resources to investment that will ultimately fail? And are Chinese financial regulators worried about an impending banking crisis caused by nonperforming loans as a result? If so, what is their strategy to deal with it?

- How does the government intend to translate its recently released national vision for talent development into concrete programs to cultivate a skilled workforce for a low-carbon economy?

- How does China negotiate the tension of welcoming foreign investment and honoring the principles of free trade as a World Trade Organization member on the one hand, while trying to cultivate "indigenous innovation" and groom national champions on the other? What are the implications of this balance for U.S. businesses, and what should be the suitable U.S. policy response?

- Will China's political structure remain flexible enough to allow true innovation and entrepreneurship, which is often the result of "creative destruction" rather than carefully planned economic growth?

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