Energy Technologies: Comparative Innovation Strategies and Technology Transfer

The 7th Installment of the Opportunity Tipping Point Series

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Event Summary

On Tuesday, September 14, 2010, the Energy and National Security Program at CSIS hosted a panel to discuss how the development and deployment of clean energy technologies will play a key role in reducing greenhouse gas emissions. The session explored how different countries approach technology innovation and some of the major obstacles and opportunities associated with technology transfer, or the diffusion of technology from public to private and country to country. The event was moderated by Sarah Ladislaw, Senior Fellow of the Energy and National Security Program at CSIS.

Deborah Bleviss, a professor of Energy in the Resources and Environment Program at Johns Hopkins School of Advanced International Studies (SAIS) and expert on technology transfer, presented *Comparative Innovation Strategies: Brazil, Germany, and Japan* where she addressed the key factors necessary for being a leader in technology transfer as well as identified the unique factors contributing to the success of Germany, Japan, and Brazil. Professor Bleviss pointed out that unfortunately, many countries in the West lack the necessary integration and instead have more "stove pipe" structures. But the critical elements for success include more than strong integrated government to support innovation. Countries must develop and support research institutions and most critically, capable private sector institutions that have two elements: R&D capability and "the ability to carry innovation forward into products and services." Market push policies move the technology past the "valley of death" and move innovation into small start ups and move the starts ups through growth and maturity. Market push refers to the beginning of the cycle while market pull policies help create the demand, such as market procurement policies.

Looking at the three countries she identified their strengths. Germany has been increasing investment in R&D, specifically in renewables and energy efficiency. Its investments in innovation institutions are a model for many including the United Sstates, and more recently, China. Germany is known as a steady market for R&D and, as a result, has consistently pulled products into the market place that would not have survived in other countries.

Japan's success is a result of the MITI (Ministry of International Trade and Industry) structure that left a lasting imprint on Japanese culture, though it no longer exists in practice, and the Keiretsu structure, where a set of companies arejoined in an interlocking system, though it is no longer dominant. These structures led to an emphasis on market push, not pull. The Japanese government looks at the whole process and create technology road maps with benchmarks and a governmental emphasis on the need to strengthen international development of R&D as part of their overall strategy.

Like the Japanese, the Brazilians have heavy government involvement along the entire path, but at the same time, Brazil is a very different case which creates policies to create both market push and pull. Important to note is that Brazil has a much more recent history of government innovation policy. Brazil has some strong universities and good R&D capacity; however, its big challenge has been bringing the fruits of their R&D to market. Recent efforts by the Brazilian government included creating policies and institutions to provide more capital to smaller companies across an array of energy related sectors.

Michael Levi, the David M. Rubenstein Senior Fellow for Energy and the Environment and Director of the Program on Energy Security and Climate Change at the Council on Foreign Relations, presented *Technology Transfer Challenges and Opportunities.* His presentation on international technology transfer went beyond the intellectual property rights to more broadly discuss the policies that determine whether a technology is transferred at all. To ensure the actual transfer and efficacy of such requires that innovation policy extends beyond borders and involves international counterparts. Mr. Levi highlighted three concepts to consider of when contemplating technology transfer policy: the perspectives of emerging countries (other than China) should be considered because country-specific views and issues will be different from China's; recognize and manage the tension between economic/competitive strategy and climate change strategy; lastly, the United States needs to understand the difference between win-win situations win-lose situations.

One of the most overlooked factors in technology transfer is that each country needs to continue innovating because it would otherwise have nothing to transfer. This also requires the government's help because research and development is often too expensive and risky for a private company to do all on its own. This assistance could come in the form of grants, partnerships, and various subsidies.

China is an example of the problem where a country's innovation system is too process improvement-focused as opposed to making fundamental innovations. This highlights how the government needs to not only promote an open system, but also become more active in open technology transfer. China's policy towards technology transfer would be deemed "hostile" with the implementation of the indigenous innovation policy. Brazil and India contrast with China in that they have more mixed policies that ultimately show a certain level of self-preference in terms of sharing technology, but both are more positive environments in those aspects than China. However, one must note that the United States also

creates barriers and has issues with foreign companies investing domestically. This highlights how countries struggle internally to balance both domestic and international interests.

Xiaomei Tan, the Project Manager of the China Climate and Energy Program at the World Resources Institute, presented *Scaling up Low-Carbon Technology Deployment: Lessons from China*. While highlighting China's innovation status, she noted that China is still ultimately concerned with the most immediate and tangible issues. She highlighted information emphasizing the problems with low-carbon technologies such as wind and carbon-conversion being deployed across China. While China has become the world's largest SC/USC (supercritical/ultra-supercritical) manufacturer, it is still only a manufacturer, not an innovator. It has long been too reliant on borrowing technology and creating joint-ventures instead of being able to innovate domestically. In the 1990s, China started localizing super-critical technologies and, in 2003, started manufacturing SC/USC technology.

The Chinese government has pushed for increased innovation in a variety of ways. It has used policy to create regulations and incentives, as well as has created a large number of research and development laboratories, established five R&D areas, established thermal power as a key program, and has set up a major project in Shanghai. However, despite much progress, China is still lagging behind in low-carbon technology innovation and the top three companies to receive the most patents in China are all foreign.

Rochelle Blaustein, the Senior Advisor for Technology Transfer at the U.S. Department of Energy's Technology Transfer Office, discussed the U.S. efforts in technology transfer, giving an overview of the DOE's endeavors to invest in research, push desirable technologies into commercialization, and support the development of key technologies. Government departments and federal laboratories have been collaborating more and reaching out to each other on various levels, with more than 700 government laboratories being involved in research and development. Many projects have spilled into the private sector through a variety of collaborations and joint-ventures, especially through efforts to support development in SMEs such as the establishment of "user facilities."

Ms. Blaustein gave an overview of the NIST, a program that gives grants to small and medium enterprises (SMEs) working with certain technologies, and she also highlighted the establishment of open centers that help bridge concerns over IPR issues and avoid the "not made here" syndrome. The DOE has a variety of groups that work in technology transfer, including the Energy Frontier Research Centers, energy innovation hubs, ARPA-e, DOE SBIR Phase III Xlerator Program, "entrepreneurs-in-residence," and other efforts to move from discovery to deployment.