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ISSUE BRIEF

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CLEAN TECH'S RISE, PART II: U.S.-China Collaboration in Public-Private Partnerships

KEY POINTS

- As the world's two largest economies and emitters of greenhouse gases, the U.S. and China have mutual interest in developing and promoting deployment of clean energy technologies. And business involvement is critical to progress.
- Public-private partnerships involving businesses and the U.S. and Chinese governments can offer benefits for clean energy, for companies, and employment.
- By pooling resources, members of these partnerships can lower costs and accelerate the development and deployment of clean energy technologies.
- Building on a long history of cooperation, in recent years the U.S. and China have launched new partnerships on energy efficient buildings, carbon capture, utilization and storage (CCUS), electric vehicles, renewable energy, and others, with differing combinations of government involvement and business initiative.
- Given the interdependence of U.S. and Chinese clean energy progress and the magnitude of the challenges, these relatively modest efforts will provide important experience to build on for the larger tasks ahead.

NEW POTENTIAL FOR U.S.-CHINA COLLABORATION

As two of the world's largest economies, competition between the United States and China often obscures another reality: As the globe's two biggest users of energy and producers of greenhouse gases, the two nations have also long collaborated on efforts to develop and scale-up cleaner energy technologies. U.S. business is widely engaged with Chinese businesses in private business relations[1] and also in public-private partnerships. Indeed, their overlapping interests in clean energy have spawned a wide array of cooperative, public-private projects that are delivering tangible benefits to both nations and the world at-large, including new markets for U.S. companies, improvements in clean tech for both countries, lower global costs of controlling pollution and emissions, and new opportunities for economic growth and jobs.[2] A key feature of public-private partnerships is that U.S. businesses recognize the benefits and are contributing funds to these initiatives.

Government agencies and companies in the U.S. and China have been collaborating on energy and climate issues for a quarter-of-a-century, notes Mark D. Levine, a senior scientist at the U.S. Department of Energy's Lawrence Berkeley National Laboratory who has been involved in U.S.-China energy partnerships for decades.[3] China, for instance, has gained key technical assistance from the U.S. that has helped it develop energy saving standards for buildings,[4] household appliances[5] and autos.[6]

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At the same time, U.S. government officials, business executives and academics have gained extensive insight into China's complex energy system and its approach to policy-making, and have built working relationships with key decision-makers.[7] Both nations are gaining practical, hands-on experience developing and deploying new technologies – from carbon capture, utilization, and storage (CCUS) to advanced wind turbines – due to China's rapid economic growth. The lessons learned, experts say, can help build mutual trust and drive down the costs of these technologies worldwide.[8] This cooperation comes at a critical time for the health of the global climate. "If the Chinese don't dramatically reduce carbon emissions from coal, there's no way we can make a dent in climate change globally in the time period that matters," says Kelly Sims Gallagher, Professor of Energy and Environmental Policy at Tufts University and ChinaFAQs expert.[9] "Because the United States and China are the world's top two greenhouse gas emitters, together accounting for more than 40% of annual emissions, any solution requires both countries to transition to low-carbon economies," writes Kenneth Lieberthal, a China expert at the Brookings Institution in Washington, D.C. "U.S.-China cooperation on climate change would have not only bilateral but global benefits."[10]

In recent years, the two nations have expanded opportunities for collaboration through a range of agreements and multilateral and bilateral organizations. In 2008, for instance, building on a 30-year history of science and technology collaboration,[11] the U.S. and China signed The Ten-Year Framework Agreement on Energy and Environment, which identifies five areas of cooperation, including clean and efficient electricity production and transmission, and clean transportation.[12] In 2009, the two nations extended the Framework, launching a wide-ranging package of cooperative efforts between private businesses, various Chinese ministries and U.S. agencies, including the establishment of three U.S.-China Clean Energy Research Centers (focusing on electric vehicles, clean coal, and buildings), an Energy Cooperation Partnership (ECP) working to match U.S. clean energy businesses with Chinese markets, the U.S. China Renewable Energy Partnership, and others.[13] Such efforts reflect the fact that "cooperation on clean energy and climate change is now seen in both Washington and Beijing as a major issue in U.S.-China relations," notes Kenneth Lieberthal. "The world has awakened," he adds, "to the potential for U.S.-China cooperation on clean energy and climate change."[14]

The examples profiled below offer a flavor of the breadth and depth of Sino-American cooperation, as well as potential benefits and challenges.

U.S.-CHINA COOPERATION ON ENERGY & CLIMATE: BROAD & DEEP

Collaborations between companies and governments in China and the United States come in a wide range of shapes and sizes, with varying degrees of participation from businesses, governments, NGOs, and academic institutions. The projects profiled below reflect this diversity. They are:

1. The US-China Renewable Energy Partnership
2. U.S.-China Clean Energy Research Center including Building Efficiency, Coal, and Vehicles
3. EcoPartnerships
4. US-China Energy Cooperation Program

The U.S.-China Renewable Energy Partnership (USCREP)[15]

In the fall of 2010, a team of engineers carefully installed an unusual, six-foot high enclosure on a windy plain some 200 miles northwest of Beijing. Inside the gray casing – which looks a bit like a giant rabbit from some angles – is a sensitive device that uses sound waves to measure wind speeds hundreds of feet up into the sky. It's called the Triton Sonic Wind Profiler, and the American-made technology helps wind farm developers identify the best, most cost-effective spots to build their power plants. The Triton is also just one example of how the U.S.-China Renewable Energy Partnership (USCREP) is helping U.S. firms gain a foothold in the growing Chinese energy market, and helping China curb its emissions of greenhouse gases.

USCREP "helped us make the right connections that led to this first key installation," says Larry Letteney, CEO of Second Wind, Inc., a 31-year-old company that makes the Triton at its manufacturing plant near Boston, Massachusetts.

The Value Proposition

Such match-making is part of USCREP's "value proposition," says David Kline, an energy specialist at the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) in Golden, Colorado, which manages

USCREP. "The U.S. has strong interests in China," he notes, ranging from fostering fair, transparent trading practices to solving energy and environmental problems that confront both nations and the world at large. As the world's two major emitters of greenhouse gases, for example, both nations have an interest in advancing technologies, such as wind power, that can reduce reliance on fossil fuels. And as China's demand for oil grows, the U.S. has an interest in helping find alternative fuels, since rising global demand will ultimately force up oil prices for U.S. consumers too.

Such common interest spurred the creation of USCREP in November 2009 as part of a broader, ten-year package of cooperative clean energy research programs agreed to by the U.S. and China. In particular, USCREP was given the task of bringing scientists, entrepreneurs and policy makers from both nations together to work on five major tasks:

- Improving wind energy technologies.
- Improving solar energy technologies.
- Developing better ways of integrating power produced by renewable sources into existing electric power grids.
- Developing rigorous international standards and testing protocols for new renewable energy technologies, in collaboration with international bodies.
- Comparing U.S. and Chinese experience with renewable energy policies and collaborating on the development of analysis tools to support RE policy development.

Those tasks, Kline notes, cover four key elements of U.S. international cooperation: "The economy, the environment, technology advancement, and energy security."

USCREP is now engaged in a range of projects (see box, *A Sampling of USCREP Initiatives*) that involve leading research institutions and companies in both nations, including NREL, China's State Grid Energy Research Institute, Alcoa, General Electric, HydroChina and Duke Energy. Some partnerships emphasize conducting basic research, such as a project involving Honeywell and DuPont that is cataloging bacteria and other organisms from China that might help make better biofuels. Others have a more applied focus, such as one between Boeing and PetroChina to test new, cleaner biofuels in passenger jets. Still others are focusing on policy and financing issues, such as analyzing import/export policies in each nation, and opportunities for foreign investment in renewable energy — and potential barriers.

A SAMPLING OF USCREP INITIATIVES

Wind Energy
- Validation of Second Wind's Triton Sonic Wind Profiler for HydroChina
- Research on turbine wake effects using data from Chinese wind farms

Solar Energy
- Alternative approaches to solar project finance
- Identifying best practices in solar project development

Biofuels
- Ethanol production through biochemical and thermochemical conversion
- Producing biodiesel from algae
- Developing sustainable feedstocks

Renewable Grid Integration
- Technical workshops
- Consultation

Standards & Testing
- Joint project on developing quality assurance standards for solar photovoltaic modules
- Cooperation between wind and solar testing laboratories
- Photovoltaic module Round Robin test activity

Policy & Planning
- Comparison of U.S. and China renewable energy policies
- Facilitation of cross-border investment in renewable energy
- Creating regional, state/province, and city-level partnerships

Together, the initiatives are "helping facilitate strategic corporate partnerships between U.S. and Chinese companies, and improve market transparency," says Kline. Efforts to develop common, internationally-accepted equipment standards and industry protocols, for instance, are helping build trust and mutual confidence; ultimately, the common standards will ensure that technical data collected in different nations is reliable, and will help level the playing field for trade by discouraging the production of inferior or substandard products.

The potential benefit of collaboration between the United States and China isn't lost on wind industry executives in both nations. China has been doubling its wind capacity annually in recent years, and building new wind farms

is a key part of China's strategy to boost the amount of power it gets from non-fossil fuel sources to 11.4% of the total by 2015. Wind power will also help China reduce its "carbon intensity" – the amount of carbon produced per unit of gross domestic product – by a targeted 17% over the same period. "There is serious discussion of and planning for producing 150 to 300 new gigawatts of wind and solar power in China by 2030," notes Kline.

The U.S.-China Clean Energy Research Center: Building Energy Efficiency, Advanced Coal Technologies and Clean Vehicles

In November 2009, President Barack Obama and President Hu Jintao announced the establishment of the U.S.-China Clean Energy Research Center (CERC). It is expected to spend at least $150 million over 5 years on research and development on clean energy technologies by teams of scientists and engineers from the United States and China. The CERC is funded in equal parts by the United States and China, with participation and funding from industry, universities, and research institutions from both countries. U.S. funds are used to support work conducted by U.S. institutions and individuals, and Chinese funds support work conducted by Chinese institutions and researchers. The three initial research priorities – each projected to have budgets of $50 million, $25 million provided by national governments matched by $25 million from businesses and other grantees – are improving building energy efficiency, developing advanced clean coal technologies, including CCUS, and developing cleaner vehicles. Together, planners of the three initiatives have already identified more than 100 research activities, the majority of which will be undertaken jointly.[16]

In mid-2011, the partners also signed innovative agreements that address a sensitive issue in U.S.-China relations: protecting and sharing intellectual property. CERC is raising intellectual property concerns "to the level of acknowledging there's a mutual need," says Gary Rieschel, founder and managing director of Qiming Venture Partners, a venture capital firm investing in clean energy in China. "I haven't seen anything that's structured with this buy-in up and down the chain."[17]

Building Energy Efficiency (CERC-BEE)

By 2030, if current trends continue, residential and commercial buildings in the U.S. and China will account for nearly one-half of the world's energy use for buildings.[18] The CERC-BEE aims to help both nations develop and commercialize cleaner, greener building technologies that can be models for the world. "Our goal is to build the knowledge, technologies, tools, and human relationships that position the U.S. and China for a future with very low energy buildings with very low carbon dioxide emissions," says Lawrence Berkeley National Laboratory's Mark Levine, who leads the U.S. component of the initiative.[19]

"For both countries, reduction in building energy consumption poses both challenges and opportunities," notes the joint work plan for the effort. "The United States needs to reduce the high-energy consumption of its existing building stock. China needs to avoid rapid growth in building energy consumption as a result of rapid construction of new buildings… Both countries have significant potential for reducing building energy consumption, as well as in increasing building energy efficiency."[20]

To reap those savings, CERC-BEE is conducting research in five areas: monitoring and simulation, the building envelope, building equipment, whole building efficiency, and commercialization. Long-term goals include implementing field demonstrations of energy-efficient lighting systems, energy control systems and real-time monitoring networks, and installing cool roofs and improved window systems.

In one early project, for example, researchers are focusing on understanding what makes a building a high- or low-energy consumer by comparing structures of similar designs, areas, and climate conditions in both countries. CERC-BEE and two U.S. companies are also bringing a Chinese-designed real-time energy monitoring system to the U.S. for installation and testing in buildings; the companies will collaboratively share and analyze the large databases produced by the systems in a bid to improve such technologies.[21]

So far, CERC-BEE's industrial partners include Dow Chemical, Schneider Electric, Honeywell, the Energy Foundation, St. Gobain, Bentley, Climate Master, GE Global Research, and Pegasus Capital Advisors. "We hope over the coming year to demonstrate the unique strength of the Chinese-U.S. collaboration on energy efficiency in buildings, so that new industrial partners will be willing to contribute additional resources to strengthen the CERC research effort," says Levine.[22]

Six other U.S. institutions are participating in the effort: the Department of Energy's Oak Ridge National Laboratory; the California Lighting Technology Center at the University of California Davis; the Massachusetts Institute of Technology; the Natural Resources Defense Council; the National Association of State Energy Officials; and private-sector energy consulting firm ICF International.[23]

The Chinese research consortium is led by the China Academy of Building Research; Tsinghua, Chongqing, Tongji, and Tianjin Universities; and the Center for Building Energy Efficiency Research of the Ministry of Housing and Urban-Rural Development.

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>
> **— CERC-BEE JOINT WORK PLAN**

CERC-BEE WORK PLAN AREAS OF FOCUS[24]

RESEARCH AREA	RESEARCH TOPICS
Monitoring and Simulation	Research on modeling building energy consumption, comparison and analysis of building energy consumption data, and development of platform to collect, monitor, and organize data.
Building Envelope	Development of new building materials and systems and research on material and system impacts on energy consumption.
Building Equipment	Development, demonstration and promotion of advanced equipment and technologies, and research on lighting systems and renewable energies.
Building Integration	Surveys and analysis on building performance, optimization of energy-efficient technologies, and selection of case studies for in-depth testing
Commercialization Research	Platform for data collection, analysis, and release of building energy consumption data, policy research on green building standards, and training of experts to promote information exchange on building energy efficiency and green building

Advanced Coal Technology Consortia (CERC-ACTC)

Could tiny aquatic plants help the U.S. and China soak up some of the carbon dioxide (CO_2) emitted by burning coal – and then be used to produce a biofuel that could replace oil? That's just one of the innovative ideas being explored by U.S. and Chinese power companies and researchers as part of the CERC's Advanced Coal Technology Consortia (ACTC).

"Together, China and the U.S. account for more than 60 percent of all the coal used on Earth," and the fossil fuel is central to their energy systems, notes Jerald J. Fletcher, a professor at West Virginia University (WVU), which leads the U.S. ACTC. "Together, we can share our brains and our budgets to accelerate the development of advanced coal technologies and enhance environmental protection."[25]

The effort, led in China by Huazhong University of Science and Technology (HUST), also involves a number of U.S. and Chinese universities, nonprofits such as the World Resources Institute, and companies including Huaneng Power International, Inc, Shenhua, LP Amina, Babcock and Wilcox, Duke Energy, General Electric, China Power Engineering Consulting Group Corporation, ENN (XinAo Group), Yanchang Petroleum and others.[26] "We've assembled some of the world's leading organizations to collaborate on these important advanced coal technologies," says S. Julio Friedmann, of Lawrence Livermore National Laboratory, another CERC ACTC partner.[27] All the U.S. consortium partners have sustained long-lived relationships with major Chinese companies, universities, and research institutions.

Each country's national government is contributing $12.5 million, matched by $12.5 million from state and private sector donors in the U.S. and China, for a total budget of $50 million over five years. Funding for the China coal consortium research comes from the Chinese government, state-owned enterprises and private companies in China. Likewise, the funding from the U.S. government is both matched by cost-share from U.S. businesses and spent towards research conducted by the U.S. consortium.[28]

CERC-ACTC AREAS OF RESEARCH IN CCUS[29]

RESEARCH THEME	PRIMARY GOAL
Advanced Power Generation	■ Help develop breakthrough technologies in clean coal power generation and application of advanced technology
Clean Coal Conversion Technology	■ Conduct research and develop new coal co-generation systems[30] with CO_2 capture including new coal-to-chemical co-generation, new CO_2 capture processes, and other combined co-generation systems
Pre-Combustion CO_2 Capture	■ Assess the economic and operability potential of existing capture technologies in conjunction with removal of common air pollutants ■ Assess the technical feasibility and potential economic benefit and operability of novel carbon capture technologies ■ Optimize the economics of different carbon capture technologies
Post-Combustion CO_2 Capture	■ Analyze, test, and demonstrate technologies for post-combustion capture integrated with sequestration at real power plants
Oxy-Combustion CO_2 Capture	■ Study the combustion and emission characteristics of different types of coal found in China and the U.S. under oxy-combustion (oxygen-rich) conditions ■ Create a model for oxy-combustion burner design, evaluation, and optimization ■ Conduct a commercial-scale engineering feasibility study for an oxy-combustion reference plant
CO_2 Sequestration Capacity and Near-Term Opportunities	■ Improve understanding and provide verification of key technologies for CO_2 storage in underground saline formations ■ Provide scientific evidence to implement large scale CCS and CCUS in China and the United States
CO_2 Algae Biofixation and Use	■ Find a practical, low cost pathway to both absorb CO_2 in a sustainable way and to turn the biomass produced into a rich source of renewable energy, including biodiesel, through innovation and technology development
Integrated Industrial Process Modeling and Additional Topics	■ Apply modeling techniques to a wide variety of issues associated with the pre- and post-combustion CO_2 capture and oxy-combustion in order to: 1. Assess the economic and operability potential of existing capture technologies in conjunction with removal of common air pollutants 2. Assess the technical feasibility and potential economic benefit and operability of novel carbon capture technologies 3. Optimize the economics of different carbon capture technologies

The effort was designed to focus on emerging commercial, field, and development projects in the U.S. and China to achieve rapid progress in advanced coal/CCUS technology development, demonstration, and enhancement. These projects serve as the platforms for collaboration and focus attention on accelerated R&D and commercialization.[31] U.S. and Chinese research teams are now launching projects in a number of areas, including the large-scale capture, use, and storage of carbon dioxide in geological formations and through algae "bio-fixation." They also will explore using oxygen to improve combustion at power plants, or oxygen combustion, and integrated gasification combined cycle (IGCC) technologies. And they will examine processes for converting coal to chemicals while simultaneously producing electricity and capturing carbon dioxide.[32]

Clean Vehicle Consortium (CERC-CVC)

The world's two largest car buyers have a lot riding on developing cleaner vehicles. With American consumers buying 12.8 million cars and light trucks in 2011,[33] and Chinese buyers acquiring more than 14.5 million,[34] the two nations share an interest in reducing oil consumption and curbing greenhouse gas emissions from vehicles. In 2010, both countries relied on roughly 50% foreign oil.[35] Auto makers in the two nations are also increasingly fierce competitors, however, so CERC's Clean Vehicles Collaboration (CVC) aims to foster technological developments that will provide both economic and environmental benefits to both countries.

"Played correctly, collaboration means China and the U.S. are 'jogging partners,' not racers," says Larry Johnson, director of the Transportation Technology R&D Center

at the Department of Energy's Argonne National Laboratory, a partner in CERC CVC. "We encourage and stimulate each other. We both get technologically and economically healthier."[36]

The CERC CVC's lead institutions – the University of Michigan in the United States and Tsinghua University in China – have mapped out about two dozen research projects spread across six "thrust areas," ranging from building better lithium ion batteries and plug-in hybrid vehicles, to developing new biofuels, cleaner burning engines and lightweight vehicle structures. Through periodic symposia and hands-on academic and industrial exchanges, the effort also aims to "create a pipeline of new engineers and scientists that are prepared to work on the right problems, to feed the transportation industry and the research enterprise at universities and national laboratories."[37]

In addition to U.S. and Chinese universities and government laboratories, the CERC-CVC partnership includes companies such as Ford, GM, Toyota, Chrysler, Geely Automobile, China Potevio, and Wanxiang. Chinese funding of $25 million is being matched by $12.5 million from the U.S. DOE and a combined $17 million from its university and industry teams over the 5-year program.[38]

Benefits of the CERC

Former U.S. Ambassador to China, Jon Huntsman summed up the value of the clean energy collaboration in remarks at the second annual U.S.-China Strategic Forum on Clean Energy Cooperation in January, 2011, which included CERC representatives. "Cooperation on clean energy is a prime example of where we can further our common interests," said Huntsman. "So when people ask me why we should cooperate with China on clean energy initiatives I say it's very simple: We are embarking on a technological revolution in clean energy... that will dramatically expand high-quality jobs, living standards, and our economy in the United States. We'll get better products, lower prices, and more jobs in both countries. I believe the possibilities in this particular area of clean energy are unlimited." Huntsman stressed that clean energy is a global challenge that "cannot be resolved unilaterally," that cooperation is needed, and commended the CERC, which he said "will help generate new ideas and new products..."[40]

Speaking at the same conference, Julio Friedman said "these partnerships are going to create jobs in both the United States and China, and they are going to lower the cost in both countries of developing and deploying clean energy as solutions to everybody."[41]

"Collaboration between our two countries is really critical. It's important. And at the end of the day, the importance is in raising the standard of living of our people in both countries," added Jim Rogers, President and CEO of Duke Energy. "...collaboration is the only answer in our sector, because we accelerate the benefits for all our people."[42]

> **"We encourage and stimulate each other. We both get technologically and economically healthier."**
>
> **— LARRY JOHNSON, ARGONNE NATIONAL LABORATORY**

CERC-CVC WORK PLAN AREAS OF FOCUS[39]

RESEARCH AREA	RESEARCH TOPICS
Energy Systems Analysis, Technology Roadmaps and Policies	Analysis of future vehicle and energy infrastructure system integration, with variable energy sources, consumer habits, economic factors, global market factors and future fuel efficiency and carbon policy regimes
Vehicle-Grid Interactions	Development of advanced control strategies, protocols, and interfaces for accelerating the deployment of plug-in electric vehicles.
Vehicle Electrification	Research in novel electric motors, waste heat recovery, and power management systems.
Advanced Batteries and Energy Conversion	Basic R&D for improving novel battery designs and utilizing new materials for waste heat recovery.
Advanced Biofuels and Clean Combustion	Accelerating advanced biofuels development and deployment by linking biotechnology to the combustion process and exhaust treatment.
Advanced Lightweight Materials and Structures	Lighter vehicles use less energy. Research is needed to realize low-cost, efficient, high-quality processes for working with advanced materials to reduce vehicle energy consumption through weight reduction.

EcoPartnerships

Two communities, two disasters. In 2007, a tornado destroyed 95% of Greensburg, Kansas; a year later, a massive earthquake leveled much of Mianzhu City in China's Sichuan province. Now, through the U.S.-China EcoPartnerships program, the two recovering communities are collaborating on developing rebuilding strategies that deliver environmental and economic benefits.

It's just one of a host of partnerships begun under the EcoPartnerships program, which was established in 2008 under the auspices of the U.S-China Strategic and Economic Dialogue, which began in 2006.[43] In particular, the program encourages governmental and non-governmental stakeholders to develop projects that help the two nations reach goals established by the 2008 U.S.-China Ten Year Framework for Cooperation on Energy and Environment,[44] including reducing air and water pollution, developing clean transport, green power, and more efficient energy use. The government assists by facilitating interaction, but provides no funding to the participants in the EcoPartnership program.[45] During the visit of Chinese Vice President Xi Jinping to the United States in February 2012, the number of active EcoPartnerships was enlarged to a total of 15.[46] The list that follows is not complete, but provides a sample of other activities undertaken by EcoPartnership participants.

Other EcoPartnerships include:[47]

- Floating Windfarms Corporation (U.S.) and Tangshan Caofeidian New Development Area, Hebei (China). Developing clean energy technologies for the Tangshan Caofeidian New Development Area, focusing on offshore wind farm technology.
- Denver, Colorado and the City of Chongqing: Cooperation for business and trade promotion, exchange of energy efficiency and sustainable development experience, and cooperation for electric vehicle infrastructure development.
- Energy Future Holdings Corp. (U.S.) and China Huadian Corporation (China): Development of sustainable business models for "clean energy," particularly in the area of clean coal.
- Port of Seattle (Washington) and Dalian Port Corporation (Liaoning): Developing a global model for energy efficient and environmentally sustainable ports.
- Wichita, Kansas and Wuxi City, Jiangsu Province: The partnership is focused on demonstration and implementation of advanced technological solutions for clean air and clean water.
- Case Western Reserve University and China National Offshore Oil Corporation: The partnership will focus on new research and technology for energy efficiency and reducing greenhouse gas emissions.[48]
- The City of Charlotte, the State of North Carolina, and Duke Energy will partner with the City of Langfang, Hebei Province, and ENN/Xin'ao Group to exchange best practices, conduct joint demonstration projects and trials for clean energy technologies, in areas such as building efficiency and smart meters.[49]
- Cities of Columbus, Ohio, and Hefei, Anhui province: This EcoPartnership plans to develop and apply electric vehicle technologies and address other energy and environmental issues facing both cities, working with private sector funding sources, local manufacturing, and academic centers to mitigate negative impacts on the environment and create green jobs.
- The Nature Conservancy's Great River Partnership and the Chinese Ministry of Agriculture's Yangtze River Fishery Administration: This EcoPartnership will work to advance river basin management and conservation of large river systems.[50]

US-China Energy Cooperation Program (ECP)

It's taking some Sino-American cooperation to get China's first "smart grid" up and running. So-called smart grids – electrical transmission networks that use sophisticated sensors and software to improve energy efficiency – are considered key to curbing greenhouse gas emissions in the 21st century. So both the U.S. and China are keenly interested in the technologies – an interest highlighted in early 2012 by the announcement that U.S.-based Honeywell was teaming with China's Tianjin Economic-Technological Development Area (TEDA) to implement China's first Smart Grid Demand Response project.[51] The partnership is just one catalyzed by the U.S.-China Energy Cooperation Program (ECP),[52] a private-sector initiated, managed and financed non-profit/non-government organization (NGO).

> **“We’ll get better products, lower prices, and more jobs in both countries. I believe the possibilities in this particular area of clean energy are unlimited.”**
>
> **— JON HUNTSMAN, FORMER U.S. AMBASSADOR TO CHINA**

The ECP – which focuses on U.S.-China business development in the clean energy sector – was founded in Beijing in September 2009 (for a full list of member companies, see www.uschinaecp.org). Since then, it has grown from 24 to about 50 member companies that are organized into nine “sector-based” working groups that look for ways to promote commercially viable clean energy projects. There are working groups dedicated to developing smart grids, for instance, as well as solar power, energy financing and energy efficient buildings. The ECP also has strong working relationships with U.S. and Chinese government agencies. [53]

Those linkages have helped ECP catalyze a wide range of innovative collaborations. In October 2011, for instance, ECP’s Sustainable Aviation Biofuel (SAB) Initiative helped launch China’s first test of a biofuel-powered airliner. Member companies Boeing, Honeywell/Honeywell UOP, United Technologies/Pratt&Whitney worked with PetroChina, Air China and China National Aviation Fuel to get a Boeing 747 partly powered by plant-based biofuels off the ground. “The flight marked the achievement of a major milestone for the SAB Initiative in its effort to promote the establishment of commercially sustainable aviation biofuel industries in China and the U.S.,” the group notes.[54]

ECP has also assisted other U.S.-based companies, such as North Carolina-based LP Amina,[55] which develops advanced emission-reduction technology, and California-based Solatube,[56] which produces advanced optics that bring natural light into interior building spaces, to become engaged in China. ECP has given “small and medium enterprises, especially those leading a new industry, the leverage needed to work with the government, reach out to the Chinese market and get results,” says Solatube General Manager Catherine Zhou.[57]

In the smart grid project, the Honeywell and TEDA partnership marks the official launch of a pilot project, jointly sponsored by the Chinese and United States governments, to develop a nationwide set of smart grid industry standards and regulations in China. “Cutting demand and consumption is [the] cheapest and cleanest source of energy,” says Stephen Shang, president of Honeywell China. And it fits neatly into the ECP’s energy savings goal by enabling energy “customers to make ‘using less’ easy and automatic.”[58]

FUTURE PROSPECTS

These wide ranging partnerships illustrate the growing interest in China and the United States in harnessing public-private collaborations to solve urgent and shared energy and climate problems. As described above, these partnerships include efforts to improve clean technology and lower costs, with potential benefits for economic growth and jobs as well as for energy security and the environment. Given the interdependence of U.S. and Chinese clean energy progress and the magnitude of the challenges, these relatively modest efforts will provide important experience to build on for the larger tasks ahead.

ENDNOTES

1 See ChinaFAQs Issue Brief: "Clean Tech's Rise, Part I: Will the U.S. and China Reap the Mutual Benefits?"

2 Former U.S. Ambassador to China, Jon Huntsman, speaking at the second annual U.S.-China Strategic Forum on Clean Energy Cooperation hosted by the Brookings Institution in January 2011. The Brookings Institution, *Second Annual United States-China Strategic Forum on Clean Energy Cooperation* (Washington, DC: 2011). Online at: http://www.brookings.edu/~/media/Files/events/2011/0118_china_clean_energy/20110118_china_clean_energy_part1.pdf

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