

## 2016 CCWG Annual Report

The U.S.-China Climate Change Working Group (CCWG) submits this Report to the Special Representatives of the Leaders of the United States and China for the Strategic and Economic Dialogue (S&ED).

### Introduction

Climate change is a pillar of the U.S.-China bilateral relationship. Over the past few years, expanded dialogue and cooperation have heralded a new era of climate leadership by the world's two largest economies. President Xi Jinping and President Barack Obama issued joint statements on climate change cooperation and action in November 2014, September 2015, and March 2016. U.S.-China climate leadership, a major contributor to the success of the December 2015 Paris Agreement, is catalyzing action to help the world transition to a low-carbon, climate-resilient future and is an enduring legacy of the U.S.-China partnership.

Underscoring this Presidential leadership is a strong commitment to bilateral engagement and cooperation on climate change. The United States and China recognize that confronting the climate threat will require sustained, long-term action. They further recognize that working constructively together to share experience and jointly develop and demonstrate technologies can accelerate solutions, cement trust, and support respective domestic actions and targets, especially those included in their Intended National Determined Contributions submitted in advance of the Paris Agreement.

The U.S.-China Climate Change Working Group (CCWG) exemplifies this recognition. Launched during Secretary John F. Kerry's visit to China in April 2013, the CCWG is a comprehensive framework for understanding and addressing climate change in the United States and China. The CCWG has grown to include nine concrete action initiatives targeting a diverse set of sectors and gases and looking both short and long-term: Heavy-Duty and Other Vehicles; Electric Power Systems; Carbon Capture, Utilization, and Storage; Energy Efficiency in Buildings and Industry; Collecting and Managing Greenhouse Gas Emissions Data; Climate Change and Forests; Climate-Smart / Low-Carbon Cities; Industrial Boilers Efficiency and Fuel Switching; and Green Ports and Vessels. Joint CCWG efforts also support ongoing engagement on hydrofluorocarbons (HFCs) and two regular bilateral dialogue series: the Enhanced Policy Dialogue and the Domestic Policy Dialogue.

Coordinated by the U.S. Department of State and the National Development and Reform Commission of China, the CCWG engages a comprehensive set of interagency actors in both governments, including the U.S. Environmental Protection Agency and the Ministry of Environmental Protection of China; the U.S. Department of Transportation and the Ministry of Transport of China; the Ministry of Industry and Information Technology of China; the U.S. Forest Service and the State Forestry Administration of China; and the National Energy Administration of China, the U.S. Department of Energy, and the U.S. Federal Energy Regulatory Commission. Through the action initiatives, these federal and central government actors engage extensively and inclusively with their subnational counterparts, as well as with civil society, academia, and private sector partners. The CCWG complements the broader array

of U.S.-China bilateral cooperative initiatives on clean energy and the environment, especially the U.S.-China Clean Energy Research Center and the U.S.-China Ten-Year Framework for Cooperation on Energy and Environment.

This report summarizes the successes of the CCWG to date, and outlines future plans for its many action initiatives and elements.

## **ACTION INITIATIVES**

### **1. Heavy-Duty and Other Vehicles**

Since the inception of the Heavy-Duty and Other Vehicles initiative in 2013, the United States and China have been cooperating in three areas to reduce the energy and environmental impacts of motor vehicles: (1) enhanced heavy-duty and other vehicle fuel efficiency standards; (2) clean fuels and vehicle emission control technologies; and (3) promotion of efficient, clean freight. Progress achieved over the last year and plans for ongoing efforts are outlined below.

#### *1. Enhanced heavy-duty and other vehicle fuel efficiency standards*

Both countries are currently developing more stringent vehicle fuel efficiency and greenhouse gas emissions standards to significantly improve air quality and reduce climate impacts. As highlighted in the September 2015 U.S.-China Joint Presidential Statement on Climate Change, both countries intend to finalize next-phase heavy-duty vehicle efficiency standards this year. The United States is developing a second phase of new greenhouse gas emissions and fuel economy standards for medium- and heavy-duty vehicles for post-2018 model years, while China is developing new fuel consumption standards for heavy-duty commercial vehicles for 2020 model years and thereafter. In order to share best practice experience in the development and finalization of these standards, the two sides intend to hold an experience-sharing workshop to bring together policy makers, industry, and other stakeholders in 2016.

In parallel, the two sides continue to promote successful experience in the deployment of electric and other zero-emission urban buses through the “Race to Zero Emissions” program. The two sides formally launched R2ZE at the 2016 China-U.S. Transportation Forum and launched the official R2ZE website (<https://www.transportation.gov/R2ZE>) to promote the program, profile the race participants, and host zero emission bus news. The two sides jointly organized a zero emission bus breakout session at the June 2016 U.S.-China Climate-Smart / Low-Carbon Cities Summit and decided to hold the R2ZE conference in conjunction with 2017 China-U.S. Transportation Forum.

#### *2. Clean fuels and vehicle emission control technologies*

Cleaner fuels (especially ultra-low sulfur fuels) are the necessary foundation for implementing more stringent emissions standards and thus for improving air quality and reducing PM<sub>2.5</sub> and black carbon emissions. The United States continues to implement its 2010 heavy-duty emission regulations, which require the use of advanced emission control technologies including diesel

particulate filters. The United States intends to implement new ultra-low sulfur (10 ppm) gasoline standards by the end of 2016. After accelerating its timeline for implementing ultra-low sulfur gasoline and diesel fuel nationwide by one year to the end of 2016, China has also accelerated its timeline for finalizing the world-class “China VI” emissions standards for light- and heavy-duty vehicles, with the intention of finalizing the standards this year and implementing them nationwide by 2020.

In October 2015, the Ministry of Environmental Protection (MEP) of China organized a Transportation Program Compliance workshop in Beijing as a forum for the United States, China, and industry actors to discuss the implementation of China’s mobile source emission control programs under its new Air Pollution Prevention and Control Law. During the workshop, Chinese officials outlined strengthened vehicle emissions compliance programs including strengthened in-use emissions testing in China using Portable Emissions Measurement System (PEMS) and Full Vehicle Testing. During the workshop, the U.S. Environmental Protection Agency (EPA) shared technical expertise and experience in successful U.S. methods for accomplishing these activities. The two sides also completed a U.S.-China laboratory round-robin testing program for heavy-duty engines.

### *3. Promotion of efficient, clean freight*

The United States and China continue to work together to further develop China’s Green Freight Initiative (CGFI) to improve efficiency in freight transport, similar to the EPA SmartWay Program. In November 2015, the Ministry of Transport (MOT), the China Road Transport Association (CRTA), and EPA participated in a CGFI Shipper Day Conference in Beijing. The Shipper Day Conference was a high-level consultation between the CGFI, CRTA, MOT and the engine and freight industries to assess the potential for the CGFI to expand program offering, engagement, and process to include shippers. Shippers are essential to drive market demand for green carriers and efficient freight services. EPA co-hosted the event and participated as keynote and panel session speakers along with the relevant MOT officials and CRTA officers. As a result of that conference, MOT and CRTA are better enabled to implement program components and elements which will strengthen and grow the CGFI with more partners implementing more strategies and technologies to achieve emission reductions from the freight sector. Moving forward, EPA will continue to support MOT and CRTA efforts to enhance and expand the CGFI, including by finalizing updated SmartWay program training materials to share with the CGFI by fall 2016, and by looking for opportunities to support a potential CGFI 2016 Summit. Finally, EPA is developing a Technology Verification Training curriculum which it will share with MOT and CRTA once complete. Meanwhile, CRTA is preparing a Green Freight Technology Training program which will be implemented by fall 2016, on the proper occasion. These curriculums will help China develop a rigorous testing program for the CGFI which can facilitate the adoption of credible fuel-saving and emission reducing technologies for China’s heavy-duty truck fleet.

Finally, as a complement to existing robust bilateral cooperation work, and in recognition of the leading experience of both countries in implementing comprehensive policies and programs to reduce the energy and environmental impacts of motor vehicles, the two sides decided to work together and with other countries to secure strong outcomes to improve fuel quality and the energy efficiency and emissions performance of heavy-duty vehicles through the G-20 this year.

## 2. Electric Power Systems

The two sides decided to enhance their collaboration on smart grid and other technologies by renaming the CCWG's existing Smart Grid initiative as the Electric Power Systems Initiative, with two associated workstreams. The first workstream, called Smart Grids, encompasses the ongoing work of the initiative since it was launched in 2013. The second workstream is a new cooperative effort on Power Consumption, Demand, and Competition.

### *1. Smart Grids*

Smart grids are modernized electric grids that facilitate greater use of renewable and clean energy generation and demand management to deliver resilient, reliable, sustainable, and affordable electricity. The CCWG's Smart Grids Cooperation, which was one of the original CCWG initiatives launched in 2013, continues to execute the agreed-to project plans for the four collaborative smart grid demonstration projects, two in each country. One set of paired U.S.-China projects is on smart, integrated distribution systems, which includes: the Philadelphia Navy Yard project by the Philadelphia Industrial Development Corporation in the United States and the Qianhai Bay Cooperation Zone project in Shenzhen, China by China Southern Power Grid Company. The other set of paired projects focuses on microgrid demonstration, which includes: the development of campus microgrid by the University of California, Irvine and the nearby Irvine Smart Grid Demonstration project by Southern California Edison, together serving as one project, and the Tianjin Eco-City project by the State Grid Corporation of China. These four projects are designed to meet the respective needs of both countries for increased reliability of the grid, maximizing efficiency of the grid, increasing renewable energy penetration in the grid, reducing greenhouse gas emissions from the system, impacting demand management, reducing overall system costs, and increasing resiliency to climate events. Significant progress made over the past year includes: (1) demonstrating energy savings of 1 to 4 percent from distribution voltage control on different electric circuits in Irvine, CA; and (2) developing advanced functionalities in end-user energy management systems, multi-state energy coordination and control, and the big data monitoring platform to improve energy efficiency, reliability, and economics in the Tianjin Eco-City, China.

Benefits analysis and evaluation of the four smart grid demonstration projects are progressing as planned. Recent evaluation results show promising benefit-to-cost ratios ranging from 3 to 7 for three smart grid technologies (a combined heat and power plant, various PV arrays, and a utility-scale Li-ion battery) on the University of California, Irvine (UCI) campus. These and analytical results of the Tianjin Eco-City project were published in a first edition of the U.S.-China White Paper on Smart Grid Benefits Analysis and Evaluation in October 2015. Both sides decided to jointly publish a final white paper, which will include analytical results of all four demonstration projects, by December 2016.

In accordance with its Implementation Plan, the Smart Grids Initiative conducted the fourth in a series of six workshops in October 2015 in Beijing. The purpose of the workshop was two-fold: (1) to conduct technical exchanges on progress made on the four demonstration projects, and (2)

to hold in-depth discussions on advanced technology and benefits evaluation by two of the Initiative's subgroups. The workshop was well represented by government and industry representatives from both countries. A majority of the delegates also attended a technical tour of the Tianjin Eco-City project facilities where smart grid technologies are deployed. During the workshop, the Advanced Technology subgroup held technical exchanges on national, industry, and enterprise standards related to four smart grid application areas: new energy grids, electric vehicle charging facilities, demand response, and intelligent substations. During this discussion, both sides agreed to the general outlines for the next phase of the cooperation, which is to establish a coordinated network of test facilities that can serve as a platform to test smart grid products to meet the prevailing national, industry, and enterprise standards in each country. The U.S. team has drafted a next-phase 2017-2018 Implementation Plan focused on standards-conformance testing of smart grid products for three of the four application areas discussed at the workshop. The two sides intend to finalize the Implementation Plan during the fifth workshop scheduled for June 2016 in Philadelphia.

In parallel, the two sides completed more than 40 expert-days of technical assistance exchanges during the China Smart Grid Technologies 2015 Reverse Trade Mission (RTM) in November 2015. This RTM, sponsored by the U.S. Trade Development Agency, brought 15 government agency officials and technical experts representing China's smart grid sector (National Energy Administration, provincial and municipal grid operators and utilities including China Southern Grid and State Grid Corporation of China) to the United States to familiarize them with the latest U.S. technologies and best practices in smart grid technologies. The RTM included a full-day business briefing in Washington, D.C., and site visits in Philadelphia and San Francisco.

## *2. Power Consumption, Demand, and Competition*

Intermittent wind and solar energy presents challenges to electricity grids and may be challenging to consume locally. China announced in March 2015 wide-ranging power sector reforms to address these challenges. With both the United States and China transitioning their power sectors to low carbon systems, the two sides decided to launch a new cooperation on Power Consumption, Demand, and Competition under the Electric Power Systems Initiative of the CCWG. An inaugural meeting was held at the 2016 S&ED where the two sides exchanged best practices on institutional innovations and policy actions for promoting power systems that support low-carbon, climate-resilient, and sustainable development.

The goals of the cooperation are to: 1) support China's domestic clean energy targets, including increasing its share of non-fossil fuels in primary energy consumption to around 20 percent by 2030; 2) cultivate an enabling environment to spur growth in private investment in our greening economies; 3) highlight U.S.-China global leadership in developing policy and technical climate solutions, with lessons for other developing countries; and 4) provide a forum for sharing the experience of both countries in our transitions to low carbon economies.

The cooperation will focus on implementation of the following three pilots in select provinces: 1) promoting local consumption of high penetration renewable energy resources; 2) improving demand response; and 3) promoting retail power market reform and direct power purchases. Both sides intend to draw on relevant U.S. and Chinese experience in the above three areas, with

a view towards China's replicating lessons learned across provinces. Both sides will develop a work plan for the cooperation, incorporating a series of U.S. and China study tours, workshops and policy recommendations for implementing these pilots. A first study tour to China is planned for fall 2016.

### **3. Carbon Capture, Utilization, and Storage (CCUS)**

Under the CCWG's CCUS Initiative, the U.S. Department of Energy (DOE) and the National Development and Reform Commission of China (NDRC) are working together to facilitate the development of CCUS projects in both countries to ultimately help drive down the cost of commercial projects.

The initiative has recognized six "counter-facing" CCUS projects to date. The goal of these projects is to create an impetus for large scale CCUS demonstration in both countries, which could help to drive down the cost of technology deployment in the future. The six Chinese projects are: (1) Yanchang Petroleum's CO<sub>2</sub>-EOR project in Shaanxi Province (selected for the Presidential CCUS initiative); (2) Shengli Oilfield Company of Sinopec Corporation's CCUS project in Shandong Province; (3) Shanxi International Energy Group's CO<sub>2</sub> utilization project in Shanxi Province; (4) China Huaneng Group/Clean Energy Research Institute's CCUS project in Tianjin; (5) China Petroleum and Chemical Industry Federation, Shenhua, and China National Petroleum Corporation's planned CCUS project in either Shaanxi, Gansu, or Ningxia; and (6) China National Offshore Oil Corporation, China Resources, and UK-China (Guangdong) CCUS Centre's offshore CO<sub>2</sub> storage project in Guangdong Province. The six Chinese CCUS projects focus on carbon dioxide (CO<sub>2</sub>) use for enhanced oil recovery (EOR), Enhanced Water Recovery (EWR), enhanced coal bed methane recovery, production of useful products (CO<sub>2</sub> for beverages, plastics, etc.), and other beneficial uses, as well as storage in deep saline formations, wherever possible. The U.S. counter-facing projects are selected from DOE's on-going \$3 billion CCUS research and development (R&D) and demonstration program.

In support of the six counter-facing projects, DOE and NDRC have hosted three CCUS workshops in China in 2014, 2015, and 2016 respectively, as well as EOR site visits.

Major achievements in the past year are as follows:

1. Recognition of Yanchang Petroleum's CCUS 1 MM tonnes CO<sub>2</sub> per year project by 2020 in the September 2015 U.S.-China Joint Presidential Announcement on Climate Change as one of two Presidential CCUS initiatives first announced in November 2014.
2. Development of a detailed engineering design for the Guangdong Offshore CO<sub>2</sub> project.
3. Co-sponsorship by DOE of a standalone CCUS workshop to highlight the offshore CO<sub>2</sub> injection project in Guangdong. The UK-China (Guangdong) CCUS Center leads this project, with collaboration from numerous Chinese enterprises and international participants, including the University of Texas-Austin's Bureau of Economic Geology, under DOE's sponsorship. As part of the collaboration and exchange between the two programs, two Chinese scholars are at UT-Austin working alongside leading U.S. researchers who developed many of the tools and knowledge needed for the Guangdong

project. The scholars' work focuses on studying geologic data from the Guangdong region. They are each working for six-month periods, and began in spring 2016.

4. Participation by DOE and NDRC in a separate, standalone CCUS workshop in Urumqi, Xinjiang in November 2015, where potential CCUS demonstration projects in the region were discussed, including several potential CO<sub>2</sub> EOR projects and other storage projects with U.S. technology providers.
5. The successful completion of the 3rd annual CCWG CCUS Workshop, which took place in Xi'an, Shaanxi Province, in early June 2016. The workshop focused on commercial and demonstration project experience, technical needs of CCUS projects, pipeline design, and CCUS standards, as well as the link between China's carbon trading and CCUS. There was also discussion about the challenges that CCUS faces, as well as regulatory matters.

Moving forward, an international team is being considered to provide technical expertise on the monitoring, reporting, and verification (MRV) program for the Yanchang CCUS project. DOE and the U.S. Environmental Protection Agency (EPA) will continue providing technical support based on the needs from Yanchang.

#### **4. Energy Efficiency in Buildings and Industry**

Energy efficiency remains one of the most powerful tools the United States and China have to save energy and decrease greenhouse gas emissions. The CCWG's energy efficiency efforts focus on accelerating the use of Energy Performance Contracting (EPC) to enable deep energy saving retrofits, as well as on identifying and promoting the "TOP TENS" Energy Efficiency Best Practices and Best Available Technologies.

Having conducted in-depth market and policy analysis in 2014, in 2015 the EPC initiative focused on promoting and assessing high-profile pilot projects in the United States and China that meet criteria both countries wish to promote. These criteria include deep energy savings, use of multiple technologies, use of standard protocols for measurement and verification, innovative financing, and more. In October 2015 at the 6th annual U.S-China Energy Efficiency Forum (EEF), three outstanding pilot projects that met all of the criteria were recognized. Each project has both a U.S. and Chinese partner; projects are estimated to save 25 to 51 percent of energy use annually and represent millions of dollars of trade and investment. The three projects are between Johnson Controls and Beijing Xinjincheng Real Estate Management Co., Ltd.; Johnson Controls and Shenzhen Coolead Energy Conservation Technology Co., Ltd.; and General Electric and Tianjin High-Trend Energy Control Ltd. Twelve additional pilot projects that met most of the criteria were also highlighted.

In 2016, the U.S. Department of Energy, U.S. State Department, and the National Development and Reform Commission carried out a new call for pilot projects with slightly revised criteria. We will recognize top pilot projects at the 7th Annual EEF in China later this year. The two sides are planning to deepen and broaden cooperation in EPC, promote EPC applications in public institutions, and analyze data from EPC pilot projects to assess actual versus planned performance.

The goal of the “TOP TENS” Energy Efficiency Best Practices and Best Available Technologies Task Group (TOP TENS) is to develop a methodology to identify energy efficiency best practices and best available technologies; develop lists of those practices and technologies; and promote their deployment and efficient use. The “TOP TENS” effort is a multilateral effort implemented through the International Partnership for Energy Efficiency Cooperation (IPEEC).

In 2014 and 2015, partner countries developed and applied a rigorous analytical process to identify best practices and best available technologies. In October 2015, the evaluation of the initial international “TOP TENS” catalogue was completed. At the March 2016 IPEEC meeting, representatives from China and the United States, as well as Australia, France, and Korea, met in Paris to review each participating country’s list and consolidated lists. Later that month, the United States, China, Australia, and Japan released their country-specific list and the first international “TOP TENS” list on the IPEEC website. The United States, China, and other partner countries will now focus on promoting deployment of technologies and practices on the list, encouraging other countries to join the initiative, improving the methodology used for developing the lists, and measuring the impact of the program in terms of energy savings.

## **5. Collecting and Management Greenhouse Gas Emissions Data**

The collection and management of accurate greenhouse gas data are critical foundations for smart climate change policies. Through the CCWG’s GHG data initiative, the United States has been providing technical expertise and support in this area, drawing on U.S. experience implementing a successful national greenhouse gas reporting program.

As China moves forward with its planned Emissions Trading System preparations, it is poised to collect national greenhouse gas emissions data for the first time in the summer of 2016. As many as 10,000 entities may report greenhouse gas data to the National Development and Reform Commission of China (NDRC). Under NDRC’s leadership, China has already developed and published 24 greenhouse gas accounting methods and reporting guidelines covering various industry sectors. The first ten of these accounting guidelines, as well as a general industry guideline, have been standardized through the Chinese National Institute of Standardization (CNIS), and the remaining guidelines are expected to be standardized by the end of 2016.

In October 2015, U.S. Environmental Protection Agency (EPA) published its 5th consecutive year of national facility-level greenhouse gas data from over 8,000 entities across the United States, representing 41 industries and approximately 90% of total U.S. GHG emissions. In March 2016, the EPA successfully collected its 6th year of detailed GHG data and is currently conducting EPA verification. In 2015, for the first time since the U.S. program’s inception, Petroleum and Natural Gas Systems reporters in the United States submitted detailed activity data under several emission categories. Published in October 2015, this expanded data set includes equipment counts and operational parameters of great interest to the oil and gas community and represents a significant step in understanding GHG emissions from this important U.S. sector. This sector is also covered in China under a draft GHG accounting guideline released in 2015.

Robust, enterprise-level greenhouse gas emissions measurement, reporting, and verification (MRV) is a prerequisite to China's national ETS program to be launched next year. In a January 2016 working notice on the ETS program, the NDRC listed eight industry sectors and 18 sub-sectors that would be covered. These sectors, which include petrochemicals, chemicals, building materials, iron and steel, non-ferrous metals, paper, power, and civil aviation, include some additional sectors beyond what President Xi first announced in the September 2015 U.S.-China Joint Presidential Statement on Climate Change. Electronic GHG emissions data collection for these sectors is expected to be completed in summer of 2016. Final preparations are being made to the electronic reporting system that will support this effort.

Under the CCWG's GHG data initiative, the U.S. continues to provide technical guidance on China's GHG accounting guidelines, with a focus on the oil and gas sector. In November 2015, the U.S. and China successfully co-hosted a technical capacity building workshop on oil and gas sector GHG accounting and reporting. The U.S. then completed an initial review of the draft Chinese oil and gas accounting guidelines and launched a pilot project with the China National Petroleum Corporation (CNPC) to improve the Chinese guidelines at a facility and enterprise level. Specifically, the pilot will focus on improving the emission factors currently used in the Chinese guidelines by working with CNPC's facility-level knowledge and experience. In April 2016, the U.S. and China co-hosted a workshop on sources and applications of power sector GHG MRV data, including sub-national applications such as in the U.S. Clean Power Plan. In spring 2016, the U.S. also conducted a software design session with China's electronic reporting development team, where U.S. experts shared lessons learned on application and database design, electronic data verification and national-sub national GHG data exchange. In the coming year, under this initiative, the U.S. will continue to leverage its information, tools, and experience to assist China's efforts to develop a robust national GHG reporting program, particularly as it rolls out its national ETS. EPA will complete the pilot on oil and gas sector GHG accounting and provide additional assistance on electronic reporting system design and data exchange.

In addition to the capacity building and pilot project efforts outlined above, the U.S. and China will collaborate on establishing robust GHG MRV guidelines for Carbon, Capture, Utilization, and Storage through cross-collaboration between the CCWG CCUS and CCWG GHG data initiatives, with an initial focus on the Yanchang CCUS project.

## **6. Climate Change and Forests**

Globally, forests and land use represent nearly one-quarter of greenhouse gas emissions. Both China and the United States have strong forest sinks, and maintaining and increasing these will form core parts of the implementation of our respective Nationally Determined Contributions under the Paris Agreement. But both the United States and China also have a large impact on forests in other parts of the world. Increasing our ability to manage our forests and measure the results of this effort is important for both domestic and international climate change efforts. This was the idea behind the CCWG's Climate Change and Forests Initiative, which focuses not only on domestic issues, but also on understanding the impact of forest-related overseas investment on greenhouse gas emissions. The initiative is also exploring additional engagement on commodities, forests, and greenhouse gas emissions.

Since the approval last June of the initiative's workplan, which covers a comprehensive set of workstreams, the two sides have embarked on an ambitious program of work and achieved strong progress to date.

Under Workstream 1, which is a policy dialogue on forests under the UNFCCC negotiations, the two sides engaged in substantive discussions on forest-related agenda items under the UNFCCC in advance of COP21. The increased understanding of our respective positions proved very helpful in the run-up to Paris, and the Paris Agreement on Climate Change includes a strong component on forests.

Under Workstream 2, which consists of technical cooperation in measuring, reporting, and monitoring related to forests, the two sides held a very successful first workshop in Beijing in September 2015. This workshop brought together about 30 technical specialists and policy makers from both governments, as well as representatives of civil society and academia, to focus on estimating and reporting forestry-related greenhouse gases. A follow-up study visit to the U.S. was held in May 2016. During this visit, experts engaged in further exploration of the institutional and technical systems related to national-level greenhouse gas monitoring for the land sector, including forest inventories, measurement of carbon pools, and interactions between different land use categories. Experts also visited a demonstration forest plot to study field measurement techniques.

On Workstream 3, which focuses on synergies between mitigation and adaptation in forests, the two sides held an initial scoping workshop in September 2015. Each side has selected two pilot sites that will be the focus of in-depth study by policy-makers and practitioners, with a workshop and pilot site visit in China in fall 2016. These sites are the Wangqing Forest Bureau and Experimental Center of Tropical Forestry in China, and the Hubbard Brook Experimental Forest, and Santee Experimental Forest in the United States.

In April 2016 in Shanghai, the two sides held a first workshop on Workstream 4, which focuses on the impact of forest-related investment on greenhouse gas emissions. The workshop brought together the two governments, the private sector, and civil society to explore why climate change is a key consideration in overseas forestry operations, and to share approaches for mitigating the

impact of operations siting and management on emissions and tools to estimate emissions and sequestration from forestry operations.

The initiative's work is informed by a civil society Advisory Board, made up of NGOs active in the U.S., China, and other countries. The Climate Change and Forests Initiative has an active body of work planned for the coming months. Experts look forward to continuing to increase collective knowledge towards reducing emissions and enhancing sequestration in forests, and better monitoring these results.

## **7. Climate-Smart / Low-Carbon Cities**

Strong climate action by cities, states, and provinces is critical for accelerating the long-term transition to a low-carbon and livable society, and for supporting the implementation of national actions and targets. The U.S.-China Climate-Smart / Low-Carbon Cities initiative under the CCWG was launched by President Obama and President Xi in the November 2014 U.S.-China Joint Announcement on Climate Change. The goal of the initiative is to respond to growing urbanization and increasingly significant greenhouse gas emissions from, and build climate resilience of, cities, states, and provinces in the United States and China by sharing experience and best practices in mitigation and climate resilience, including through an annual high-level meeting.

The first U.S.-China Climate-Smart / Low-Carbon Cities Summit was held in Los Angeles, United States in September 2015. At the Summit, 29 cities, counties, states, and provinces of the two countries signed the "U.S.-China Climate Leaders Declaration," which included the launch of a new initiative by provinces and cities in China for peaking pioneers, and medium- and long-term greenhouse gas emission reduction targets of states, counties, and cities in the United States. Keynote addresses were made by U.S. Vice President Joseph R. Biden and China's State Councilor Yang Jiechi. Over 500 people attended the summit across six breakout sessions focusing on low carbon city planning, finance, transportation, buildings, resilience, and energy.

The second China-U.S. Climate-Smart / Low-Carbon Cities Summit was held in Beijing, China in June 2016. At the Summit, 66 provinces, cities, states, and counties from both countries endorsed the U.S.-China Climate Leaders Declaration. The summit was attended by over 1,000 people including leaders from 49 Chinese cities and provinces and 17 U.S. cities, states, and counties across three plenary sessions and 17 breakout sessions focusing on low-carbon and climate-resilient development topics. China's State Councilor Yang Jiechi again delivered a keynote address at the summit, as did U.S. Secretary of State John F. Kerry.

Other highlights of the two summits included the signings of dozens of MOUs and arrangements between sub-national governments, NGOs, research institutions, and private sector companies, and the convening of two exhibitions showcasing low-carbon cities, technologies, and services. The summits included individuals from local and federal governments, the business and private sector, and civil society from both countries and helped build high-level political momentum for strong climate action, enhance capacity at the local level, and mobilize business and private sector engagement.

The City of Boston plans to host the next U.S.-China Climate-Smart / Low-Carbon Cities Summit in 2017.

The two sides continue to explore opportunities for additional work on Smart Infrastructure for Urbanization, including climate-smart city pilot and demonstration projects.

## **8. Industrial Boilers Efficiency and Fuel Switching**

China's industrial boiler systems consume 700 million tons of coal annually, accounting for 18% of the nation's coal consumption and approximately 1.3 gigatons of annual carbon dioxide emissions. To improve efficiency and reduce emissions from these boilers, the United States and China are working toward implementing boiler efficiency solutions, developing innovative financing models, and sharing experiences in boiler system tracking, monitoring, and standardization under the CCWG's Industrial Boilers Efficiency and Fuel Switching initiative.

Launched in 2014, the initiative began by selecting two pilot cities to focus on – Ningbo and Xi'an – and developing a U.S.-China collaborative analysis and implementation roadmap for addressing energy and environmental challenges of industrial boilers in the two cities. The policy implementation roadmap, released in 2015, was based on a techno-economic assessment which outlined three alternatives: (1) fuel switching to alternative fuels; (2) retrofitting existing boilers with energy efficient systems; and (3) replacing small scale boilers with a community-scale system. This work supports China's Comprehensive Implementation Plan of Improving Coal-Fired Boiler Energy-Saving and Environmental Protection Performance (National Boiler Action Plan), which focuses on phasing out small-scale boilers. The action plan aims to replace obsolete boilers with high efficiency boilers, which currently only account for 5% of the market. The plan outlines steps to phase out inefficient, small-scale boilers (classified as those which produce less than 10 tonnes of steam/hour).

As follow-up to the assessment, the two sides led a study tour for financing partners and U.S. technology providers to Ningbo and Xi'an in January 2016 to meet with local stakeholders interested in retrofitting or replacing small-scale boilers. During the study tour, presentations from technology providers were followed by analysis of business models and financing mechanisms to enable investment in efficient boiler systems. Proposed business models included community-scale boiler service centers, enterprise joint partnerships, a boiler operation outsourcing model, a boiler-tune up maintenance service contract model, and a boiler technical retrofit energy performance contract model. The study tour built relationships between technology providers, financiers, and government, as well as introduced possible financing models which will enable future project development.

Next steps will focus on furthering implementation of efficient boiler systems including:

1. The addition of a U.S. boiler specialist to the joint technical team to help conduct onsite boiler efficiency assessments in selected industrial facilities in the two pilot cities. The

onsite assessment will aim to identify technologies and processes for system-wide efficiency improvements.

2. A study tour to the U.S by Chinese central government and local stakeholders in pilot cities for site visits to relevant institutions and research facilities in late 2016.
3. The sharing of experiences in enforcement and standardization of boiler systems for efficient boiler operations.

## **9. Green Ports and Vessels**

Goods movement through marine and inland ports and vessels produces significant emissions of air pollutants and black carbon. Marine vessel air emissions impact climate as well as air quality in densely populated port cities, along vessel routes, and far inland. U.S. models developed for the North American Emissions Control Area showed air quality impacts from vessel emissions along the U.S. coasts reaching as far inland as Nebraska.

The United States and China are major trading partners. While the largest U.S. container port receives approximately 2,000 vessel calls a year, the largest Chinese container port receives about 40,000 vessel calls a year. China is home to eight of the ten largest ports in the world. Collaboration on greening ports and vessels is aimed at assessing emissions and environmental and climate impacts and sharing best practices to reduce them.

U.S.-China collaboration on green ports and vessels was initiated at the 2015 Strategic and Economic Dialogue, which established the Green Ports and Vessels Initiative (GPVI) as a joint initiative of the Climate Change Working Group and the Ten Year Framework for Cooperation on Energy and Environment. The GPVI is designed to build capacity and share experience, best practices, tools, and technologies to assess and reduce emissions of air pollutants and black carbon from ports and vessels and achieve air quality, health, and climate co-benefits.

Since establishing the GPVI in 2015, the two sides have worked effectively to advance and implement the initiative. A GPVI team was established and is led by the U.S. Environmental Protection Agency and the Ministry of Environmental Protection of China, with the Ministry of Transport of China. The team developed a comprehensive work plan to implement the initiative. The work plan encompasses four major areas of collaboration, as well as participation by key stakeholders such as leading ports and national and provincial authorities in China and the U.S.

Major areas of cooperation include:

1. Comprehensive emissions inventory methodologies and analyses for ports and vessels, as well as air quality modeling and monitoring capabilities;
2. Policies, strategies, technologies, and best practices for emissions reductions from ports and vessels;
3. Best practices and technologies in development, adoption, implementation, compliance, and enforcement of domestic emissions control areas (DECAs); and,

4. Pilot projects/activities with leading ports/authorities may include one or more of the following: emissions inventories, incentive programs, DECA implementation, practices, or technologies.

Future activities of the initiative over the next year include at least two workshops and one study tour. The first U.S.-China Green Ports and Vessels Initiative Workshop will be held June 13-16 in Shanghai, and will feature expert presentations, capacity building, case studies, best practices demonstrations, and strategic discussions on both drivers for emissions reductions for ports and vessels and emissions inventories and emissions reduction practices, including emission control areas. Over 100 participants from national and provincial environmental, transportation, and marine authorities are expected mainly from China's eleven core DECA port areas. The second workshop and a subsequent study tour, proposed for Fall/Winter 2016 to the United States, would give Chinese port and vessel emissions reduction stakeholders the opportunity to visit with U.S. leading ports, environmental authorities and laboratories, and explore technologies, best practices, and experience in port and vessel emissions reductions.

## **OTHER INITIATIVES**

### **Hydrofluorocarbons (HFCs)**

President Obama and President Xi made agreements twice in 2013, and in March 2016 committed to work bilaterally and with other Parties to achieve a successful outcome of an HFC amendment under the Montreal Protocol this year pursuant to the Dubai Pathway.

In the course of dialogues and workshops over the past year, the two sides identified several common policies and approaches to reduce the use of high-GWP HFCs in each country, and identified areas to pursue further cooperation.

Domestically, the United States: (1) completed a regulation in 2015 that prohibits certain high-GWP HFCs in specific applications and is estimated to avoid 54-64 MMTCO<sub>2</sub>eq of HFC emissions in 2025; (2) expanded the list of approved climate-friendly alternatives; and, (3) in April 2016, proposed further restrictions on the use of certain HFCs. China plans to (1) continue implementing HFC-23 byproduct controls from HCFC-22 production facilities before the end of 2020, and to (2) promote the Low GWP alternatives of HFCs in domestic market in foam, refrigeration and air conditioning sectors.

The two sides recognize there is a need for further action to reduce use and emissions of HFCs, have exchanged views on domestic and multilateral processes on HFCs, and will explore cooperation on the process for revising safety standard to facilitate the deployment of low-GWP alternatives.

The two sides agree to further exchange views on HFC issues, and to cooperate closely in achieving our joint goals of reducing production, consumption, use, and emissions of HFCs.

## **Enhanced and Domestic Policy Dialogues**

To complement the practical bilateral cooperation that occurs through the nine action initiatives, the CCWG also facilitates regular policy dialogues.

Special Representative for Climate Change Affairs of China Xie Zhenhua and then-U.S. Special Envoy for Climate Change Todd Stern met regularly throughout 2015, as the two sides worked to negotiate and forge consensus on a path toward the successful Paris Agreement. Post-Paris, the two sides continue to meet regularly, including under current U.S. Special Envoy for Climate Change Jonathan Pershing, to advance next steps toward implementing the Paris Agreement, and to discuss other key opportunities for climate progress including through the Montreal Protocol, ICAO, and the G-20, and on climate finance and low-carbon, climate-resilient development, domestically and internationally. The two sides intend to continue regular meetings, including on the margins of the S&ED, the CCWG intersessional, and other opportunities whenever possible.

The policy dialogues also enable frank and constructive information-sharing on respective policy progress and challenges in achieving domestic climate targets and transitioning over the long-term to low-carbon, climate-resilient economies. Recent meetings have focused on China's climate action planning, U.S. domestic action on power plants, and respective sharing of greenhouse gas emissions modeling and projections, including mid-century modeling. A high-level exchange on domestic policy also occurred during the Joint Session on Climate Change at the S&ED. The two sides intend to continue regular meetings.

## **Possible Areas of Future Cooperation**

Moving forward in their bilateral cooperation, the United States and China agree to explore how the CCWG might be optimized with a view to supporting each country's respective implementation of current and future NDCs. They consider that analysis linking the policy, research, and pilot project work of the CCWG to current and future NDC implementation would be a valuable input to future CCWG initiative development and prioritization, including for potentially selecting new initiatives and for bolstering existing ones. They further consider that the CCWG's activities should support their respective mid-century low emissions strategies under development.

## **Institutional Framework**

The CCWG is chaired by high-level representatives from both sides, who meet throughout the year for in-depth discussions with the active participation of relevant government ministries on both sides. The CCWG reports annually to the S&ED and also holds an intersessional meeting each year. The CCWG will continue to serve as a high-level forum to coordinate the action initiatives outlined in this report, develop recommendations for new action initiatives, and enhance the policy dialogue on the multilateral climate negotiations process as well as on domestic climate policy in the two countries. Both sides intend to continue to involve other stakeholders, where appropriate, in the work of the CCWG. The two sides plan to hold the next CCWG intersessional meeting in China in early 2017.