United States Government Accountability Office

Report to the Chairman, Subcommittee on Europe, Eurasia, and Emerging Threats, Committee on Foreign Affairs, House of Representatives

July 2016

U.S.-CHINA COOPERATION

Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring

GAO-16-669

July 2016

U.S.-CHINA COOPERATION

Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring

GAO Highlights

Highlights of GAO-16-669, a report to the Chairman, Subcommittee on Europe, Eurasia, and Emerging Threats, Committee on Foreign Affairs, House of Representatives

Why GAO Did This Study

The United States and China lead the world in energy consumption, and both are investing in renewable resources and efforts to increase the efficiency of traditional fossil fuel sources in part to address climate change. In 2014, a congressional commission raised questions about bilateral cooperation between the United States and China on clean energy, including potential IP risks to U.S. participants involved in collaborative research projects.

GAO was asked to review government-led U.S.-China collaborative initiatives on clean energy. This report examines (1) how much funding U.S. agencies obligated for clean energy cooperation with China, (2) what is known about the results of key programs and the extent to which they follow leading practices in performance monitoring, and (3) the extent to which DOE managed risks that CERC participants may face. GAO analyzed funding data, reviewed documents and compiled reported results, interviewed agency officials and participants of key programs, and conducted site visits.

What GAO Recommends

GAO is making four recommendations to enhance performance monitoring, including that DOE, USTDA, and State each develop targets for program-level performance and track progress against them for the key programs GAO reviewed. The agencies agreed with GAO's recommendations and plan to take actions to address them.

View GAO-16-669. For more information, contact Kimberly Gianopoulos at (202) 512-8612 or gianopoulosk@gao.gov, or John Neumann at (202) 512-3841 or neumannj@gao.gov.

What GAO Found

In fiscal years 2008–2015, U.S. agencies obligated a total of about $97 million for clean energy cooperation with China. Two-thirds of this money was obligated for three key programs (projects of which are depicted from left to right below):

- a Department of Energy (DOE) program, the U.S.-China Clean Energy Research Center (CERC), that has focused on research and development in clean coal, clean vehicles, and energy efficiency in buildings;
- a U.S. Trade and Development Agency (USTDA) program focused on export promotion through projects such as feasibility studies and trade missions; and
- a Department of State (State) program that includes information sharing and technology demonstration projects across various clean energy technologies.

Examples of Projects under Key U.S.-China Clean Energy Cooperation Programs

Sources (and project descriptions from left to right): (1) Department of Energy (clean coal project), (2) Koeppen and Elliott Associates (U.S. Trade and Development Agency trade mission to promote U.S. energy efficiency products), and (3) ©Advanced Power and Energy Program at the University of California, Irvine (Department of State grid modernization project to utilize solar energy). | GAO-16-669

The key programs have yielded some results and have performance monitoring tools but generally lack targets for their performance, making the significance of their progress unclear. Examples of the programs' results include: for CERC, as of the end of 2015, the launch of 15 products, such as software for enhancing energy efficiency of buildings; and for the USTDA program, through fiscal year 2015, about $230 million in U.S. exports from its clean energy projects. Based on performance monitoring principles in the GPRA Modernization Act of 2010, it is a leading practice for federal programs to link goals to performance measures with established targets. Without targets, it is unclear how results compare with intended performance and what improvements may be needed; this is particularly important as DOE and State officials are planning the next phases of their programs and USTDA emphasizes the role of data in program decisions.

DOE identified intellectual property (IP) risks CERC participants may face, such as participants not having a clear plan for protecting IP, and took steps to manage them. These steps included requiring agreements clarifying IP rights and providing training, in part to encourage participants to share IP created outside of CERC projects. DOE officials said this IP sharing is important for valuable research and development collaboration. CERC participants GAO spoke with reported no significant issues with DOE's management of IP risks but, nonetheless, have been reluctant to share IP. DOE officials acknowledged that participants face a tradeoff between the risks and benefits of sharing IP with Chinese participants and that it is appropriate for companies to assess risks for themselves.

Contents

Tables

Figures

Abbreviations

CERC	U.S.-China Clean Energy Research Center
CCWG	U.S.-China Climate Change Working Group
DOE	Department of Energy
ENR	Bureau of Energy Resources
GPRAMA	GPRA Modernization Act of 2010
IP	intellectual property
OES	Bureau of Oceans and International Environmental and Scientific Affairs
S&ED	U.S.-China Strategic and Economic Dialogue
State	Department of State
USTDA	U.S. Trade and Development Agency

U.S. GOVERNMENT ACCOUNTABILITY OFFICE
441 G St. N.W.
Washington, DC 20548

July 5, 2016

The Honorable Dana Rohrabacher
Chairman
Subcommittee on Europe, Eurasia, and Emerging Threats
Committee on Foreign Affairs
House of Representatives

Dear Mr. Chairman:

The United States and China, the world's largest economies, lead the world in energy consumption and depend largely on traditional fossil fuel sources. Together, China and the United States account for roughly 40 percent of global carbon dioxide emissions annually, according to the U.S. Energy Information Administration. Concerns over rising emissions of greenhouse gases, such as carbon dioxide, and their effects on the climate have led most countries to adopt or consider adopting policies to reduce these emissions.[1] In part for these reasons, the United States and China are seen as instrumental in multilateral efforts to address climate change. Individually, in an attempt to reduce greenhouse gas emissions, both the United States and China are investing in renewable resources and also in efforts to increase the efficiency of traditional fossil fuel sources. In 2015, China led the world in renewable energy investments with an estimated $102.9 billion in new investments, while the United States invested approximately $44.1 billion.[2] In addition, the United States and China have increased bilateral cooperation on clean energy in an effort to spur progress.

In 2014, the congressional U.S.-China Economic and Security Review Commission raised concerns about U.S.-China cooperation on clean

[1]Greenhouse gases absorb heat emitted from the Earth's surface, and increases in the atmospheric concentrations of these gases cause the Earth to warm by trapping more of this heat. According to a report by the National Academy of Sciences and the Royal Society, continued emissions of these gases will cause further climate change, including substantial increases in global average surface temperature and important changes in regional climate.

[2]The Frankfurt School – UNEP Collaborating Centre for Climate & Sustainable Energy Finance, *Global Trends in Renewable Energy Investment 2016*, accessed March 31, 2016, http://fs-unep-centre.org/sites/default/files/publications/globaltrendsinrenewableenergyinvestment2016lowres_0.pdf.

energy, including a lack of clear public reporting on results and potential risks to participants in joint research and development projects due to concerns related to China's protection of intellectual property (IP) rights. Because of these issues, the commission recommended that we conduct an assessment of government-led U.S.-China collaborative initiatives on clean energy; subsequently, you requested that we do so. In this report, we examine (1) how much funding U.S. agencies have obligated to clean energy cooperation with China, (2) what is known about the results of key U.S.-China cooperation programs and the extent to which these programs follow leading practices in performance monitoring, and (3) the extent to which the U.S. Department of Energy (DOE) manages risks that may face U.S. participants in the U.S.-China Clean Energy Research Center (CERC).

To address these objectives, we analyzed funding data and documents, interviewed agency officials, and conducted site visits to locations in California, Michigan, and West Virginia and phone conferences to interview program participants, including from the three organizations leading collaborative research under CERC. The U.S. government has no uniform definition of clean energy that is applied government-wide. However, based on consultation with participating agencies and review of the White House's June 2013 Climate Action Plan, we determined that the following types of energy technologies are relevant for this review: renewable energy (including solar, wind, hydro, geothermal, and biofuels); energy efficiency technologies (i.e., technologies that decrease the intensity of energy usage); nuclear power; natural gas; clean coal (e.g., coal with carbon capture, utilization, and storage[3]); clean vehicle technologies; and improved energy infrastructure (e.g., smart grids[4]).

To identify the funding obligated to clean energy cooperation with China from fiscal years 2008 through 2015, we sent a questionnaire to agencies that we identified as being involved in these efforts. Among other items,

[3]Carbon capture, utilization, and storage is a family of technologies and techniques that enable the capture of carbon dioxide from fuel combustion or industrial processes, the transport of carbon dioxide via ships or pipelines, its utilization for other industrial processes, and its storage underground in depleted oil and gas fields and deep saline formations.

[4]Smart grids are networks that monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end users. They are intended to improve reliability and efficiency and facilitate the use of alternative energy sources.

the questionnaire asked them to identify their U.S.-China clean energy cooperative activities and the amount of funding obligated to each activity by fiscal year. We took steps to ensure that agency responses were complete, such as by comparing the responses against other agency documentation, and also sent questions to the agencies to determine the reliability of the sources of the data. We determined that the data provided were reliable for our purposes.

To describe what is known about the results of U.S.-China clean energy cooperation, we focused on three key programs to which the largest amount of funding was obligated by the three agencies that provided the most funding to U.S.-China clean energy cooperation. These key programs were identified as DOE's CERC, the U.S. Trade and Development Agency's (USTDA) East Asia Program, and the Department of State's (State) U.S.-China Climate Change Working Group (CCWG). To describe these key programs' results, we analyzed agency documents and clarified and assessed the reliability of results data in these documents through interviews with agency officials, among other steps. We determined that the data provided by the three programs are sufficiently reliable for describing their results. To determine the extent to which these programs follow leading practices in performance monitoring, we examined agency and program performance documents and interviewed agency officials.

To determine the extent to which DOE has managed any risks that CERC participants may face, we first determined what risks those might include through interviewing DOE officials and a nongeneralizable sample of CERC participants.[5] We also analyzed relevant documents, such as the Technology Management Plan for each CERC track, and compared steps such as these that DOE has taken to manage IP risks with federal internal control standards for risk assessment.[6] Appendix I provides a more detailed description of our objectives, scope, and methodology.

[5]Specifically, in addition to DOE officials and management and researchers at the U.S.CERC lead organizations, we interviewed representatives of three U.S. participants in the clean vehicles track, four U.S. participants in the clean coal track, and three U.S. participants in the energy efficiency in buildings track. These participants included eight private companies, one university, and one national lab that participate, or have participated, in CERC. One private company did not comment on IP because it did not participate in a research project with China, so that company is not included in our analysis of IP issues.

[6]GAO, *Standards for Internal Control in the Federal Government*, GAO/AIMD-00-21.3.1 (Washington, D.C.: November 1999).

We conducted this performance audit from June 2015 to July 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Overview of U.S. Cooperation with China and Other Countries on Clean Energy and the Environment

The United States and China have cooperated for over 35 years on science and technology initiatives. In 1979, the two countries signed a bilateral science and technology agreement that has served as an umbrella agreement for subsequent bilateral environment and energy initiatives.[7]

In 2008, the countries established the Ten Year Framework for Cooperation on Energy and Environment. This framework was intended to facilitate the exchange of information and best practices to develop solutions to the environment and energy challenges both countries face. The framework includes some action plans related to clean energy, such as plans for clean, efficient, and secure electricity; clean and efficient transportation; and energy efficiency. According to staff from think tanks and business associations and other individuals knowledgeable about U.S.-China clean energy cooperation that we interviewed, U.S. cooperation with China on clean energy could yield benefits such as building trust between the countries, helping both countries advance their efforts to meet environmental challenges, and creating opportunities for U.S. businesses in China. According to these individuals, the sharing of any IP through this cooperation is a potential risk due to possible IP theft.

In November 2014, the two countries' presidents issued a U.S.-China Joint Announcement on Climate Change, which included targets to reduce greenhouse gas emissions in the United States, and for China to

[7]Agreement Between the Government of the United States of America and the Government of the People's Republic of China on Cooperation in Science and Technology, January 31, 1979.

intend to reach peak carbon dioxide emissions around 2030 and increase the share of non-fossil fuels in its energy consumption. The announcement also emphasized the countries' commitment to a successful climate agreement at the United Nations Climate Change Conference in Paris in 2015, and the countries' presidents reaffirmed this commitment in a U.S.-China Joint Presidential Statement on Climate Change in September 2015. In December 2015, more than 190 member states under the United Nations Framework Convention on Climate Change came together to adopt the Paris Agreement, which aims to hold the increase in the global average temperature to well below 2 degrees Celsius above pre-industrial levels through countries setting their own nonbinding targets for emissions reductions. In Paris, some of the countries that adopted the Paris Agreement also committed to initiatives to substantially increase public and private investment in climate change mitigation and adaptation activities. For example, through the Mission Innovation initiative, 20 countries, including the United States and China, will seek to double their governmental clean energy research and development investment over 5 years to accelerate clean energy innovation and make it widely affordable.

In addition to its bilateral cooperation with China, the United States cooperates bilaterally and multilaterally with other countries on initiatives related to climate change and clean energy. For example, the United States has a Clean Energy Dialogue with Canada to encourage the development of clean energy technologies to reduce greenhouse gases and combat climate change. Also, in 2009, the United States launched the Partnership to Advance Clean Energy with India, which is working to accelerate inclusive, low carbon growth by supporting research and deployment of clean energy technologies. Both the United States and China, along with 21 other countries and the European Commission, participate in the Clean Energy Ministerial,[8] a high-level global forum to promote policies and programs that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. The Clean Energy Ministerial is focused on improving energy efficiency worldwide, enhancing clean energy supply, and expanding clean energy access.

[8]The Clean Energy Ministerial comprises representatives from Australia, Brazil, Canada, China, Denmark, the European Commission, Finland, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Norway, Russia, Saudi Arabia, South Africa, Spain, Sweden, the United Arab Emirates, the United Kingdom, and the United States.

Concern over China's Protection of IP Rights

As U.S. cooperation with China on science and technology has expanded over time, China's protection of IP rights has been a persistent concern. Although some IP issues have been addressed through dialogues, such as the U.S.-China Joint Commission on Commerce and Trade,[9] according to a 2016 report by the U.S. Trade Representative,[10] the uncertain IP environment is a leading concern for businesses operating in China. According to the report, the theft of trade secrets remains a particular concern, and conditions are unlikely to improve as long as those committing such theft continue to operate with relative impunity. The report also identified concerns about reports that Chinese government policies may have negative impacts on U.S. investors and their IP rights, including that Chinese regulations, rules, and other measures appear to require foreign companies to transfer or license their IP rights to domestic Chinese entities in order to do business in China.

U.S. clean energy companies may face particular IP concerns with regard to doing business in China. China's 5-year plan for economic and social development initiatives for 2016–2020 includes developing its environmental technology industry as a focus area. The U.S. Trade Representative has expressed concern that China's innovation-related and other industrial policies may have negative impacts on U.S. exports or IP in particular industries by encouraging actions that pressure foreign IP rights holders to transfer those rights to domestic Chinese entities.

[9]The United States and China established this high-level forum for addressing bilateral trade matters and promoting commercial opportunities in 1983.

[10]United States Trade Representative, *2016 Special 301 Report* (Washington, D.C.: April 2015).

U.S. Agencies Obligated About $97 Million in Total for Clean Energy Cooperation with China for Fiscal Years 2008 through 2015

U.S. agencies obligated about $97 million for clean energy cooperation with China over the 8-year period of fiscal years 2008 through 2015. More than 90 percent of this money was obligated by three agencies: DOE, USTDA, and State. Two-thirds of the overall funding went to three key programs, which are the largest U.S.-China clean energy cooperative programs at each of these agencies. Almost half of the funding went to research and development, and the overall funding went to a variety of types of clean energy, with the majority for energy efficiency, clean coal, and clean vehicles.

DOE, USTDA, and State Obligated Nearly All the Funding, Mostly for Three Programs

In total over the period encompassing fiscal years 2008 through 2015, U.S. agencies obligated about $96.9 million for U.S. agencies, other public entities, and private sector participants to cooperate with Chinese entities related to clean energy.[11] DOE obligated the majority of this funding (71 percent). USTDA and State obligated another 13 percent and 11 percent, respectively. Two-thirds of the overall funding went to the largest related programs at each of these agencies (see fig. 1), which are the three key programs we focused on:

- **DOE's CERC program:** Through CERC, DOE obligated $47.5 million for teams of U.S. scientists and engineers to perform research and development with China on clean energy technologies. This collaboration is being pursued for reasons beyond attempting to address climate change, including to improve air quality, to lower energy costs, and to promote energy security. The work through fiscal year 2015 was separated into three tracks focused on clean coal, clean vehicles, and energy efficiency in buildings.[12] DOE funds U.S. researchers in each of the tracks, while the Chinese government funds the Chinese researchers, with the intention that U.S. and

[11]Agency obligations to the U.S. side of clean energy cooperation with China come from a variety of appropriations accounts, which are listed in app. II.

[12]Work under the first 5-year phase of CERC ended in fiscal year 2015, but obligations in that year were for the second phase of CERC, which also included funding for a new track on the interaction of energy and water. An additional track on medium- and heavy-duty vehicles is expected to receive funding in fiscal year 2016. The official names of the first three tracks are Advanced Coal Technology, Clean Vehicles, and Buildings Energy Efficiency.

Chinese researchers will be working together and learning from each other on all projects.

- **USTDA's East Asia Program:** Through its East Asia Program, USTDA obligated $12.5 million for U.S. companies to engage in various types of clean energy projects with China, such as feasibility studies, trade missions,[13] and technical assistance.[14] These projects have focused on a wide range of clean energy technologies related to smart grids, clean coal, and shale gas, among others.

- **State's CCWG program:** Through CCWG, State obligated $5.8 million for U.S. participation in cooperation and dialogue with China on clean energy. Through fiscal year 2015, CCWG's clean energy cooperation has occurred through groups of projects bundled into six initiatives: (1) heavy-duty and other vehicles; (2) smart grids; (3) carbon capture, utilization, and storage; (4) energy efficiency in buildings and industry; (5) climate-smart and low-carbon cities; and (6) industrial boilers efficiency and fuel switching.[15]

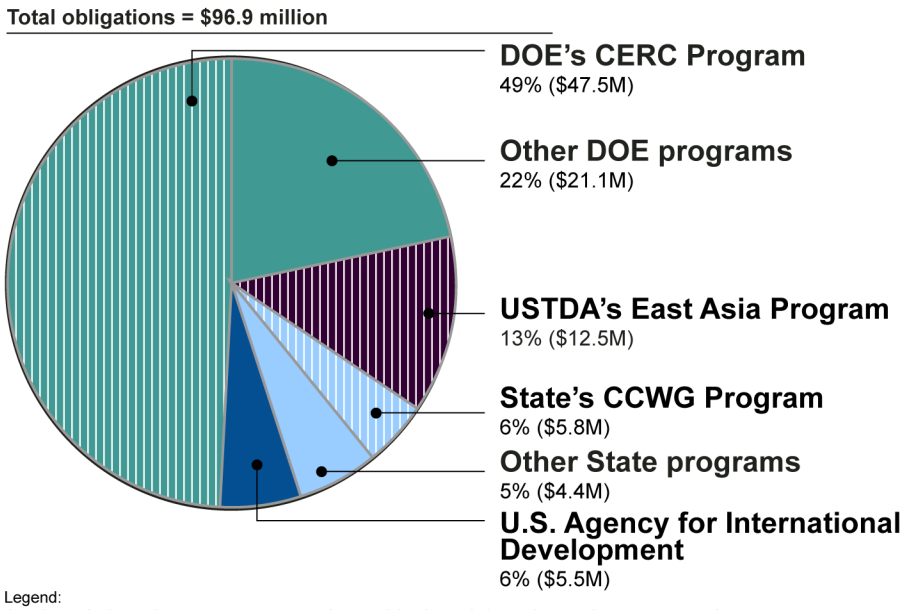
In addition to the U.S. federal funding obligated to these key programs, U.S. private sector participants also cover a share of the costs of some projects. For CERC and USTDA's East Asia Program, such cost-share increases the overall U.S. funding spent on these projects by approximately double. Agency officials have pointed out that cost-share from private companies shows the companies' confidence in the programs' ability to achieve results.

[13]USTDA uses the term "reverse trade missions" to refer to their trade missions because they bring foreign decision-makers to the United States to observe the design, manufacture, and operation of U.S. products and services.

[14]In our report, we limit our discussion of the East Asia Program to its clean energy projects in China. The overall program also has provided similar trade capacity building assistance to other parts of the energy sector as well as the transportation and health care sectors in China and Mongolia.

[15]In our report, we limit our discussion of CCWG to its six initiatives focused on clean energy. CCWG also has other aspects that are outside the scope of our review, including initiatives on greenhouse gas emissions data and forests, initiatives that have started since fiscal year 2015, and policy dialogues to facilitate discussions on climate change between the United States and China.

Figure 1: Three Agencies Obligated the Majority of U.S. Government Funding for Clean Energy Cooperation with China, Fiscal Years 2008–2015



Legend:
CERC = U.S.-China Clean Energy Research Center; CCWG = U.S-China Climate Change Working Group; DOE = Department of Energy; State = Department of State; USTDA = U.S. Trade and Development Agency

Source: GAO analysis of agency data. | GAO-16-669

Notes: Because of rounding, amounts shown do not sum to total, and percentages shown do not sum to 100 percent. In addition to the funding shown in the pie chart, the Departments of Commerce and Transportation and the Federal Energy Regulatory Commission together obligated less than 0.1 percent of the total $96.9 million in obligations.

Seven other agencies also engaged in clean energy cooperation with China during this period.

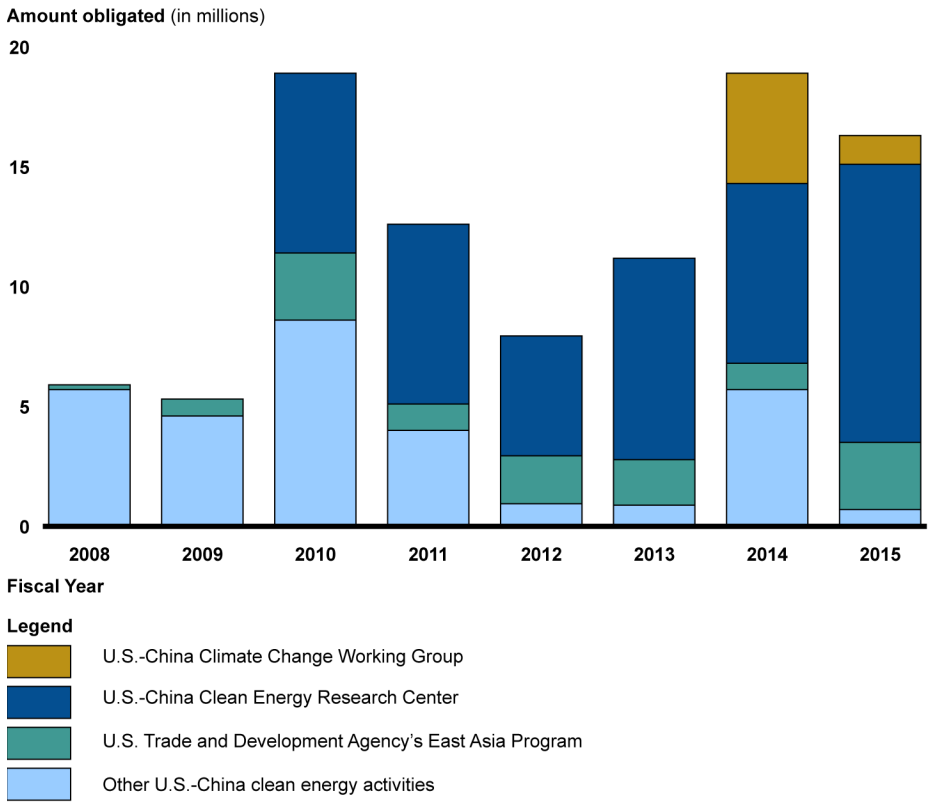
- The U.S. Agency for International Development obligated $5.5 million for two technical assistance programs in China, one focused on energy efficiency in buildings and another focused on various forms of clean energy development, such as financing clean energy projects.
- The Departments of Commerce and Transportation and the Federal Energy Regulatory Commission each obligated between $1,800 and $32,000 for clean energy cooperation with China during this period, mostly for travel expenses to attend events or consultations in China for regulatory cooperation.
- The Departments of Agriculture and the Interior and the Environmental Protection Agency participated in clean energy cooperation with China using funding provided by DOE or State.

In addition, some agencies provided funding for their own travel expenses to attend related events or to organize some related activities but were unable to identify the amounts of such funding specifically related to clean energy cooperation.

Annual U.S. obligations for U.S.-China clean energy cooperation varied in fiscal years 2008 through 2015. As figure 2 shows, large increases in annual obligations occurred in fiscal years 2010 and 2014, which were within the years following the launches of the CERC and CCWG programs, respectively.[16]

[16]The USTDA East Asia Program funded projects in China related to clean energy throughout this period, with the amount of obligations varying per year depending on the number of related projects that were funded each year and the amount of funding provided to each project.

Figure 2: Obligated U.S. Government Funding for Clean Energy Cooperation with China, by Fiscal Year, 2008–2015



Source: GAO analysis of agency data. | GAO-16-669

Almost Half the Funding Supported Research and Development

As seen in figure 3, U.S. government funding provided to clean energy cooperation with China supported numerous types of activities.

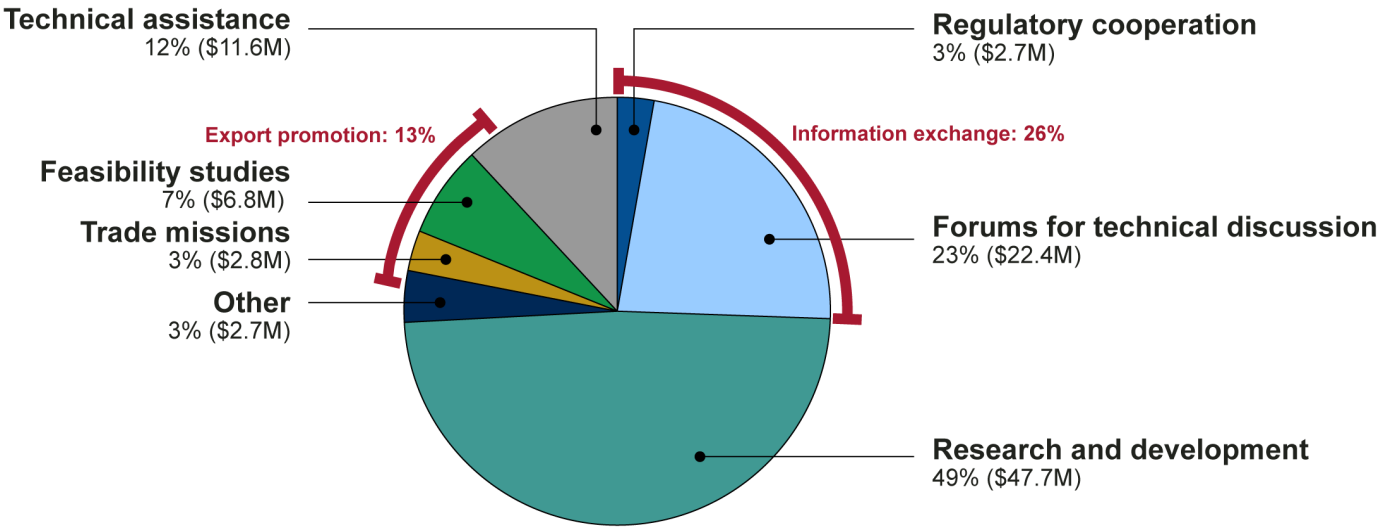
- **Research and development:** Almost half the funding was obligated by DOE for research and development to promote clean energy innovations, with most of that funding for CERC. According to DOE officials and CERC participants, through research and development under CERC in particular, U.S. participants gain important benefits, such as the ability to speed progress in their research through collaboration with other U.S. researchers and leading Chinese scientists and engineers and access to unique experimental platforms unavailable in the United States. In addition, U.S. companies obtain the opportunity to demonstrate the viability of their products in China's large market.

- **Information exchange:** Another 26 percent of the funding supported different types of information exchange, including forums for technical discussion and regulatory cooperation. For example, there are annual meetings between the United States and China organized to discuss energy efficiency, renewable energy, and clean coal, and there have been other forums held to discuss topics such as biofuels, smart grids, and smart cities. According to agency officials, these forums have multiple benefits for U.S. participants, including opportunities to highlight U.S. businesses, to work toward harmonizing codes and standards between China and the United States, and to share regulatory best practices.

- **Export promotion:** Activities to promote U.S. exports received about 13 percent of the funding, all of which was from USTDA and included feasibility studies, trade missions, and some technical assistance. Feasibility studies help U.S. companies demonstrate the viability of their technologies to prospective Chinese buyers. Through trade missions, USTDA brings Chinese officials to the United States to observe the design, manufacture, and operation of U.S. clean energy technologies. Also for export promotion, USTDA provided technical assistance to Chinese officials through technical exchange, training, and standards development programs. USTDA funds all such projects with the intention to create U.S. exports while supporting China's efforts to reduce carbon emissions through the deployment of clean energy technologies.

- **Other types of activities:** The remaining 12 percent of the funding went to other types of technical assistance and activities such as demonstration projects in China using advanced renewable energy technologies, surveys in northwestern China to identify sites for demonstrations of carbon capture and storage, a study of the shale gas potential in one Chinese province, strategy development, and training efforts to promote IP protection.

Figure 3: Obligated U.S. Government Funding for Clean Energy Cooperation with China, by Type of Activity, Fiscal Years 2008–2015



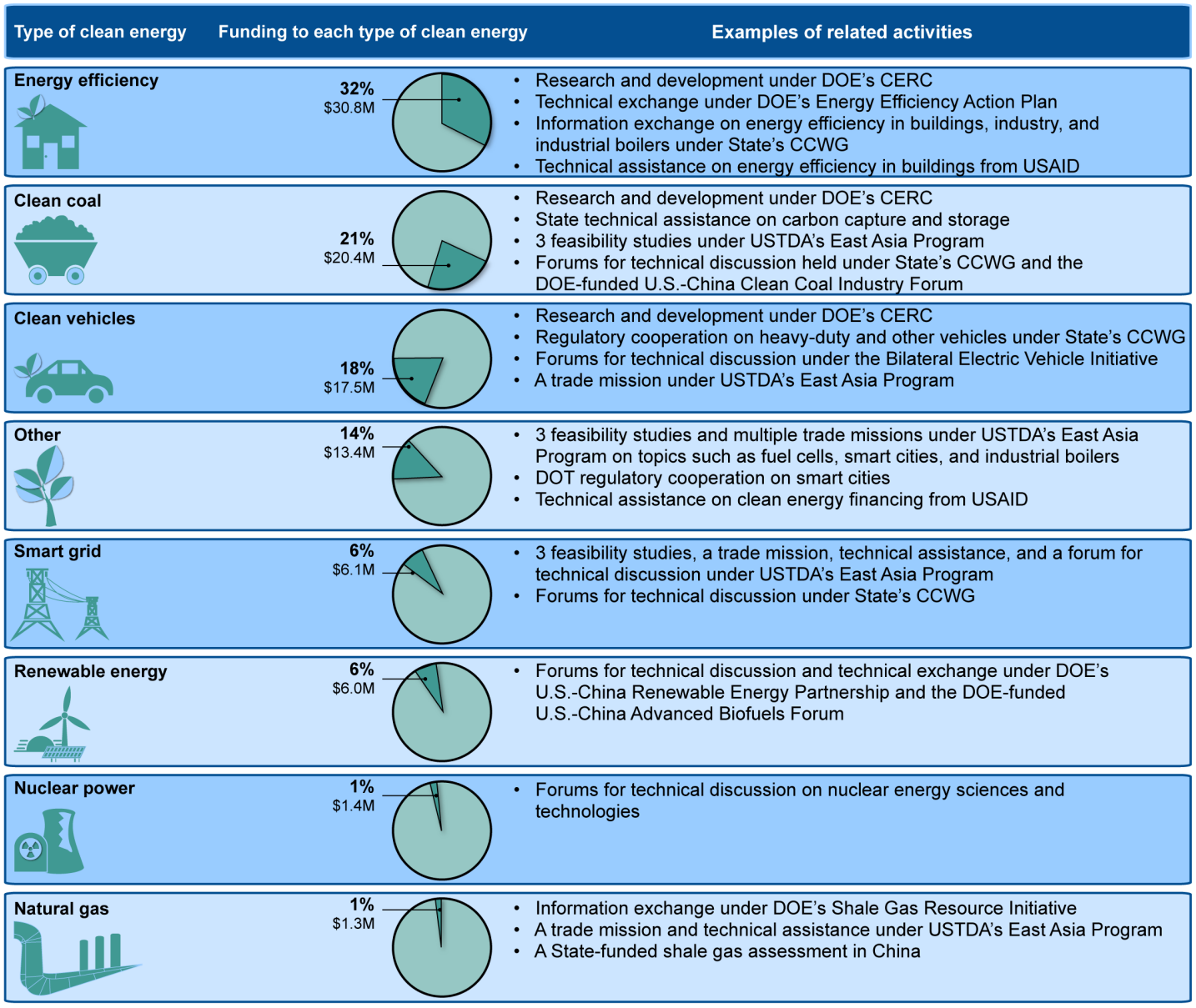
Source: GAO analysis of agency data. | GAO-16-669

Note: Because of rounding, amounts shown do not sum to the total $96.9 million in funding obligations shown elsewhere in this report.

Funding Supported Cooperation on a Wide Range of Clean Energy Technologies

U.S. government funding supported cooperation on a wide range of types of clean energy technologies. As seen in figure 4, the largest portions of funding went to energy efficiency, clean coal, and clean vehicle technologies, which related to the three areas that the CERC program focused on through fiscal year 2015.

Figure 4: Obligated U.S. Government Funding to Clean Energy Cooperation with China, by Type of Clean Energy, Fiscal Years 2008–2015



Legend:
CERC = U.S.-China Clean Energy Research Center; CCWG = U.S.-China Climate Change Working Group; DOE = Department of Energy; DOT = Department of Transportation; State = Department of State; USAID = U.S. Agency for International Development, USTDA = U.S. Trade and Development Agency.

Source: GAO analysis of agency data. | GAO-16-669

Note: Because of rounding, percentages shown do not sum to 100 percent.

Key Programs Have Yielded Some Results and Monitor Performance, but They Lack Targets, Making the Extent of Progress toward Their Goals Unclear

All three key programs have yielded some results. For example, CERC projects had led to the launch of 15 products by the end of 2015, including software for enhancing energy efficiency in buildings. In addition, by the end of fiscal year 2015, the 24 USTDA projects from its East Asia Program included in our review had generated about $230 million in U.S. exports, and the six CCWG initiatives we reviewed had trained 48 people on global climate change. In addition, the three programs have tools to monitor performance such as performance reports and program reviews. Generally, however, the three programs lack targets for their performance measures and USTDA does not have agency-wide targets. Agency officials provided various explanations for why it was difficult for them to set targets, including that CERC was a new program when it started work in 2011 and that USTDA is a demand-based agency. However, establishing targets for these programs, and for USTDA agency-wide, could help managers generate and communicate more meaningful performance information that they could also learn from to identify performance shortfalls and pinpoint options for improvement.

The Three Key Programs Have Yielded Some Results

Our analysis of the measures and documents used by the three programs to track performance at the program and lower levels shows that all of the programs have yielded some results, such as the number of products launched as a result of CERC, the dollar value of exports generated by USTDA's projects, and the number of people trained on global climate change by CCWG initiatives.

U.S.-China Clean Energy Research Center (CERC)

The U.S. and Chinese presidents established CERC in November 2009 and renewed this commitment in November 2014. CERC has three tracks of research on clean coal, clean vehicles, and energy efficiency in buildings. Projects in each track include the following.

- **Clean coal track:** Projects performing cost analysis and demonstrations of emissions capture technologies (see top left photo below).
- **Clean vehicles track:** Projects on advanced battery systems (see top right photo below), vehicle electrification, and materials to reduce vehicle weight.
- **Energy efficiency in buildings track:** Projects demonstrating U.S. technologies in Chinese buildings, including for cool roofs and sprayable sealant (see bottom photo), and modeling occupant behavior.

Sources: Department of Energy, GAO, and ©2012 The Dow Chemical Company. | GAO-16-669

DOE's CERC Program. CERC was announced in 2009 and work began on projects in 2011. As seen in table 1, at the program level, CERC has yielded results for select key performance measures through the end of 2015. According to CERC officials, CERC's key performance measures are the program's most important and relevant measures.

Table 1: Results of Select Key Performance Measures for the U.S.-China Clean Energy Research Center, as of December 31, 2015

Performance measure	Results 2011–2015
Number of significant research results	44
Number of researchers supported by CERC (both countries)[a]	1,124
Number of invention disclosures[b]	13
Number of patent applications	26
Number of products launched	15
Major diplomatic outcomes attributed, in part, to CERC	7
Number of major intellectual property education and training products (documents, websites, and videos) developed	11
Number of joint conferences, workshops, technical meetings, and training sessions[a]	248
Number of participants at intellectual property workshops and training sessions[a]	1,177

Source: GAO analysis of U.S.-China Clean Energy Research Center (CERC) documents. | GAO-16-669

Note: CERC did not set targets for any of its key performance measures through the end of 2015.

[a]According to CERC, this number is an estimate.

[b]An invention disclosure is a description of an invention provided in a confidential form to begin the process for pursuing intellectual property protection and potential commercialization.

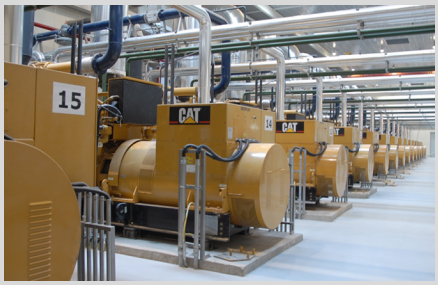
Beyond the results tracked for these program-level performance measures, each track has also achieved significant technical outcomes, according to DOE. For example, the clean coal track used data from a Chinese power plant's carbon dioxide capture process to model that system in a U.S. power plant and found that it could cost significantly less to capture carbon dioxide than initially estimated. Also, the energy efficiency in buildings track developed and commercialized a moisture and air sealant that reduces energy consumption and is environmentally friendly; and the clean vehicles track developed techniques to model hybrid powertrains for vehicles that are now being applied to design a hybrid light truck.[17]

[17]For additional technical outcomes that CERC considers significant, see http://www.us-china-cerc.org/.

U.S. Trade and Development Agency (USTDA) East Asia Program

In fiscal years 2008–2015, USTDA's East Asia Program funded 24 projects in China on clean energy. The projects generally were of the following three types.

- **Feasibility studies:** These projects allow U.S. companies to show how their proven technologies can work in China. USTDA has funded such studies on topics such as smart grids, energy efficient data centers, and power generators using coal mine methane gas (see top photo below).
- **Trade missions:** These projects brought Chinese officials to the United States to learn about U.S. shale gas and energy efficiency technologies (see bottom photo below), green buildings and city planning, and vehicle fuel economy standards.
- **Technical assistance:** These projects inform Chinese officials, such as through workshops on U.S. shale gas practices; developing a model for smart grids in China; and assisting the development of Chinese smart grid standards that would be harmonized with U.S. standards.



Sources: USTDA and Koeppen and Elliott Associates. | GAO-16-669

USTDA's East Asia Program. According to our analysis of USTDA project-level results, the 24 USTDA projects included in our review from the East Asia Program had generated about $230 million in U.S. exports through the end of fiscal year 2015.[18] The exports generated as a result of these projects range from $160,000 from a feasibility study funded in fiscal year 2011 to almost $135 million from a feasibility study funded in fiscal year 2009. According to USTDA, these exports have supported about 1,500 U.S. jobs based on a Department of Commerce methodology for estimating U.S. jobs attributable to U.S. exports.

Thus far, the completed USTDA clean energy projects included in our review have resulted in a U.S. export multiplier of about 36—for every dollar obligated by USTDA the agency identified about $36 in U.S. exports generated.[19] This compares with USTDA's overall multiplier, for fiscal year 2015, of $74 in U.S. exports for every dollar in agency funding.[20] USTDA projects have also yielded results for project-level performance measures showing the projects' development impact on recipient countries. Examples of development impact results for the East Asia Program's clean energy projects include projects that, individually, led to an estimated 200 permanent jobs in China, about 20 people in China receiving training and skill development, and 50 megawatts of new energy capacity, according to USTDA.[21]

[18]USTDA is still monitoring all but two of these projects for additional exports, and it is possible that these projects could generate further exports in the future, according to USTDA.

[19]We calculated the U.S. export multiplier for the 24 clean energy projects we reviewed by dividing the U.S. exports generated by the 14 projects completed as of the end of fiscal year 2015 by the amount of funding obligated to those projects in fiscal years 2008 through 2015. According to USTDA, the other 10 projects were still ongoing as of the end of fiscal year 2015 and therefore have not yet reached the stage at which they could generate U.S. exports.

[20]For fiscal year 2015, USTDA calculated the U.S. export multiplier for the agency by dividing the exports generated by all projects between 2003 and 2012 by the amount of funding obligated for those projects. USTDA states that it uses a 10-year period in its export multiplier calculation to allow for, among other things, the time it can take projects to generate exports.

[21]It is not possible to aggregate the results of USTDA's development impact measures across the East Asia Program projects we reviewed, because USTDA revised these measures in December 2014. USTDA has been working since then to collect data that can be aggregated across USTDA projects.

U.S.-China Climate Change Working Group (CCWG)

CCWG was launched in April 2013 to advance cooperation between the two countries on technology, research, and alternative and renewable energy. Through fiscal year 2015, CCWG had six initiatives on the following aspects of clean energy, which it generally expects to renew at the end of fiscal year 2016 for another 2-year period.

- **Heavy-duty and other vehicles:** This initiative focuses on regulatory cooperation to enhance fuel efficiency and emissions standards; fuel quality standards; and clean, efficient freight.
- **Smart grids:** Through this initiative, the countries are each demonstrating and sharing information on two smart grid projects (see left photo below).
- **Carbon capture, utilization, and storage:** This initiative has six demonstration projects in China on the use of carbon dioxide for enhanced oil recovery and other uses. U.S. partners learn from projects and provide some technical assistance.
- **Climate-Smart/Low-Carbon Cities:** This initiative will include demonstrations in U.S. and Chinese cities and information sharing.
- **Energy efficiency in buildings and industry:** This initiative includes sharing best practices on energy performance contracting and energy efficiency upgrades (see right photo below).
- **Industrial boilers efficiency and fuel switching:** Through this initiative, U.S. and Chinese researchers conducted an assessment of China's coal-fired industrial boilers and plan to implement identified strategies to improve their efficiency.

Sources: © Advanced Power and Energy Program at the University of California, Irvine, and ©2015 Abigail Watrous. | GAO-16-669

State's CCWG Program. CCWG was announced in 2013, and work for the initiatives covered in our review began in either fiscal year 2014 or 2015. Based on our aggregation of the targets and results of the six CCWG initiatives we reviewed, through fiscal year 2015, CCWG has yielded some progress related to seven of eight performance measures CCWG uses to monitor performance for these six initiatives, as shown in table 2. Results data are reported to State by DOE, the Department of Transportation, and the Environmental Protection Agency, which implement CCWG activities.[22] Generally, any initiative-level targets set for these performance measures were designed to be met in late fiscal year 2016 or fiscal year 2017, and State officials said that they expect to see more results near the end of the initiatives, because that is when more activities are planned. In addition, one initiative had a change in its scope of work that has delayed its activities. CCWG initiatives have also achieved additional outcomes not captured by their initiative-level performance measures. For example, the energy efficiency in buildings and industry initiative developed three partnerships between U.S. and Chinese companies that could reduce their buildings' energy use by 25 to 51 percent.

[22]Four of the initiatives are implemented by DOE; one, by DOE and State; and one, by the Department of Transportation and the U.S. Environmental Protection Agency.

Table 2: Performance Measures, Targets, and Results through Fiscal Year (FY) 2015 for the U.S.-China Climate Change Working Group Initiatives Related to Clean Energy

Performance measure	Aggregate initiative-level targets before end of FY 2016	Aggregate initiative-level results through FY 2015
Amount of investment leveraged in U.S. dollars, from private and public sources, for climate change[a]	$1,650,000	$11,000
Number of laws, policies, strategies, plans, or regulations addressing climate change (mitigation or adaptation) and/or biodiversity conservation officially proposed or adopted[b,c]	15	4
Number of people receiving training in global climate change[b,c]	900	48
Number of person hours of training completed in climate change[b,c]	80,000	576
Number of days of technical assistance in climate change provided to counterparts or stakeholders[b]	80	13
Projected greenhouse gas emissions reduced or avoided through 2030 from adopted laws, policies, regulations, or technologies related to clean energy (measured in metric tonnes carbon dioxide)	200,078	14,000,000
Number of stakeholders with increased capacity to adapt to the impacts of climate change	100	0
Number of institutions with improved capacity to address climate change issues[c]	65 to 68	10

Source: GAO analysis of U.S.-China Climate Change Working Group (CCWG) documents. | GAO-16-669

Note: This table shows aggregate targets generally to be met before the end of fiscal year 2016 and results through fiscal year 2015 for four of the six CCWG initiatives we reviewed. State officials said that they expect to see more results near the end of the initiatives when more activities are planned. State did not have performance measures for two of those initiatives until September 2015, so the initiatives had no results to report through the end of fiscal year 2015. Each performance measure in the table may not include targets and results related to each initiative because each initiative has independent sets of measures.

[a]Both the Department of Transportation and the Environmental Protection Agency anticipate some cost sharing for their initiatives for this performance measure but did not set quantitative targets.

[b]Results reported for this performance measure include initiatives for which the implementing agencies were not required to report on this measure, and as a result there are no related targets for those initiatives. According to State officials, they encourage agencies to report on all relevant performance measures, as applicable, to ensure that they have comprehensive results.

[c]The targets set for the Environmental Protection Agency for this performance measure are to be met by the end of the second quarter of fiscal year 2017.

In addition, DOE and State officials said that their programs had achieved results related to the bilateral relationship with China that could not be quantified. For example, DOE and State officials said that the trust built between the United States and China on climate issues through the joint work and dialogue under CERC and CCWG, respectively, helped to enable the November 2014 U.S. and Chinese Presidents' Joint Announcement on Climate Change. These officials said that this announcement helped catalyze the December 2015 Paris Agreement on climate change.

Although the Three Programs Monitor Performance, They Generally Lack Targets, Making It Unclear How Results Compare with Intended Performance

All three programs monitor progress toward their goals through a variety of tools, such as performance reports and program reviews. Two of the programs also have performance measures reflecting their goals and collect data on some of those measures; however, none of the programs have targets for all their performance measures, which would enable them to compare the results that they have achieved with the results they had planned to achieve. To help manage program performance, linking goals to performance measures that are tracked against established targets is a leading practice for federal programs.[23] In addition, USTDA did not have targets for most of its agency-wide performance measures. The GPRA Modernization Act of 2010 (GPRAMA) requires agencies to publish a performance plan that, among other things, contains performance measures with established targets that can be used to assess progress toward achieving those targets.[24]

DOE's CERC Program

CERC monitors program performance through a combination of routine reports and specific data requests. DOE requires that each track submit quarterly reports. Although most information in these reports is provided at the project level, these reports also contain information on some of the program's performance measures, such as measures related to intellectual property creation. However, DOE officials largely collected information regarding CERC's program performance through specific data requests, such as to prepare for meetings or program-level reports. DOE officials emphasized that they focus their performance monitoring at the project level, where there have been more than 80 projects within the three CERC tracks. Each project follows a 10-point plan describing, among other elements, the research objective, work schedule with interim milestones, and deliverables and dates. Officials said that these plans are the basis for the information in the quarterly reports and are how CERC holds projects accountable for their performance. At the project level,

[23]This leading practice for lower levels within federal agencies, such as programs, is based on requirements for agencies in the GPRA Modernization Act of 2010 (GPRAMA), as we have previously reported in GAO, *Diesel Pollution: Fragmented Federal Programs That Reduce Mobile Source Emissions Could Be Improved*, GAO-12-261 (Washington, D.C.: Feb. 7, 2012) and *Environmental Justice: EPA Needs to Take Additional Actions to Help Ensure Effective Implementation*, GAO-12-77 (Washington, D.C.: Oct. 6, 2011).

[24]31 U.S.C. § 1115 (b). GPRAMA requires that agency performance plans be made available on a public website of the agency and describe how their performance measures with established targets (referred to in GPRAMA as performance goals) contribute to the general goals and objectives established in the agency's strategic plan.

performance monitoring also occurs through review meetings, such as reviews by industrial partners and DOE management, peer review of projects under one of the tracks by DOE's Office of Energy Efficiency and Renewable Energy, and other technical reviews by that office as well as DOE's Office of Fossil Energy for projects under the remaining two tracks. See appendix III for more information on CERC's organization and reporting relationships.

DOE officials monitor CERC's performance against four overarching goals that they said have been the objectives of CERC since it was established. Those goals are to

- accelerate development and deployment of clean energy technology;
- expand and strengthen bilateral engagement between the United States and China;
- protect intellectual property, encourage its development, and improve U.S.-China interactions regarding intellectual property; and
- facilitate market access to participating businesses to speed technology deployment.

Officials said that they use 19 key performance measures, each linked to at least one of the four goals, to indicate progress toward those goals.[25] However, during the first phase of CERC that ended in fiscal year 2015, none of these performance measures had targets.[26] According to DOE officials, setting targets for CERC was difficult because it was a new program focused on a new model of collaborative research and development and they did not have enough information to create targets when it first started work in 2011. In addition, officials said it is difficult to know what a research and development program will accomplish before it begins. However, according to Office of Management and Budget

[25]Overall, CERC has 36 performance measures for the program, some of which are related to multiple goals.

[26]CERC did set a target for one performance measure that was not a key measure—the percent of joint projects. The target for this measure was 100 percent.

guidance, agencies managing any research and development program should develop targets to measure progress toward its goals.[27]

CERC is a high-visibility program for U.S-China cooperation on clean energy, with the Secretary of Energy and his Chinese counterpart involved in annual program reviews. In addition, CERC is planning to start its second phase in 2016 and is in the process of developing new work plans for each track for this phase, according to DOE officials. If CERC does not have targets, as suggested by leading practices, managers may not have the information needed to make timely improvements to ensure that progress toward goals remains on track and to clearly communicate to DOE leadership how CERC is performing against its intended results.

USTDA and Its East Asia Program

According to USTDA officials, the agency monitors performance of the agency's East Asia Program through annual meetings during which all levels of USTDA staff review USTDA's regional programs by sharing lessons across the programs and discussing program results. USTDA examines program efficacy by reviewing information on funded activities, countries and regions, and industry sectors. Officials said that USTDA's Office of Program Monitoring and Evaluations provides the East Asia Program and the agency with data that can be used to examine program performance and identify areas for improvement.

USTDA assesses its projects while they are ongoing and soon after they have been completed. These assessments focus on several areas, including the implementation potential of the project; feedback from project participants; and project impacts, such as U.S. exports and the development impact on the recipient country. USTDA also uses an independent evaluator to evaluate almost all its projects. These evaluations occur on an annual basis to determine whether the projects have resulted in additional exports or development impacts until USTDA determines that no further results are likely to occur, which can take 5 years or longer. USTDA follows these same monitoring practices for all of its programs throughout the agency. See appendix III for more information on USTDA's organization and reporting relationships.

[27]The Office of Management and Budget has provided guidance to agencies that they should describe the targeted outcomes of research and development programs using meaningful, measurable, and quantitative metrics where possible (OMB, *Multi-Agency Science and Technology Priorities for the FY 2017 Budget*, July 9, 2015).

USTDA has agency-wide goals used to evaluate its performance. Officials further stated that these goals flow down from the agency to the East Asia Program. The goals are to

- create U.S. jobs by supporting exports of U.S. goods and services for priority development projects in emerging economies,
- foster opportunities for U.S. small businesses through significant involvement in USTDA's programs, and
- utilize evidence and evaluation data to guide agency programming decisions.

Each agency-wide goal has associated performance measures. These same measures are also used to monitor the East Asia Program, according to USTDA officials. USTDA set a target for one of the agency-wide performance measures—to exceed the Small Business Administration's benchmark of 23 percent of federal prime contracts awarded to U.S. small businesses—although USTDA officials said that they do not break down this target by program.[28] None of the other agency-wide or program-level performance measures had targets,[29] although the agency does set targets at the project level for some performance measures reflecting certain goals such as potential exports.

USTDA officials said that there are several reasons why they do not have targets for most of their performance measures at the agency or program level. Because USTDA is a demand-based agency, with projects generally proposed by industry, officials said that it is difficult to know what kinds of projects will be proposed and ultimately approved and funded. Furthermore, officials said that having a precise target for each

[28]The President is required to establish annual government-wide goals for procurement contracts awarded to various types of small business concerns. In doing so, the goal established shall not be less than 23 percent of the total value of all prime contracts for each fiscal year across the entire federal government (15 U.S.C. § 644(g)) but may be more, as negotiated with the Small Business Administration. USTDA has chosen to set its goal at 23 percent.

[29]The seven other performance measures specified in USTDA's strategic plan are (1) the agency's total cumulative U.S. exports generated (since 1981), (2) the agency's U.S. export multiplier, (3) the percentage of total program funding dedicated to priority markets, (4) the percentage of total program funding dedicated to priority sectors, (5) the number of activities that include opportunities for engagement with U.S. small businesses, (6) the number of USTDA-funded activities evaluated annually, and (7) the use of evidence-based methodologies to set priorities for the upcoming fiscal year.

performance measure could produce a perverse incentive by encouraging them to fund a project in order to meet a given target, even if they did not think it was the project most worthy of being funded. USTDA officials are also concerned that targets would reduce their flexibility in allocating USTDA's resources. For example, officials said that they have strategic reasons for investing in certain countries, including responding to U.S. government policy priorities, even if those projects will not necessarily produce the most exports, and targets could limit their ability to fund those projects. However, as GAO has previously reported, if an agency has measurable, balanced performance measures that cover all an agency's priorities, this should prevent an overemphasis on one or two priorities at the expense of others that may skew an agency's performance.[30] Without published agency-wide targets, as required by GPRAMA, it is unclear if agency managers have the information they need to determine if they are making sufficient progress toward achieving their goals, to identify performance shortfalls and options for improvement, and to provide Congress and the public with information needed to enhance their oversight and better ensure the agency's accountability. Furthermore, without targets at the program level, as suggested by leading practices, managers risk not being able to use all the information generated from long-term project evaluations to inform timely improvements, such as in deciding which types of projects to fund in particular countries or regions.

State's CCWG Program

State officials said that they monitor the performance of CCWG as a program through two reports that focus on initiative-level activities: (1) internal reports on the status of the CCWG initiatives that are presented annually to the U.S. Special Envoy for Climate Change and his Chinese counterpart and (2) public reporting of CCWG's annual performance by initiative to the chairs of the U.S.-China Strategic and Economic Dialogue (S&ED). The reporting to the S&ED is CCWG's main monitoring mechanism, according to State officials.

[30]See GAO, *Tax Administration: IRS Needs to Further Refine Its Tax Filing Season Performance Measures*, GAO-03-143 (Washington, D.C.: Nov. 22, 2002). In this report, we identified nine attributes of performance measures, including balance, based on previously established GAO criteria, the Government Performance and Results Act of 1993, and performance management literature. We have used these attributes to evaluate various programs, including in GAO, *International Space Station: Measurable Performance Targets and Documentation Needed to Better Assess Management of National Laboratory*, GAO-15-397 (Washington, D.C.: Apr. 27, 2015).

As shown previously in table 2, the six CCWG initiatives within our review have performance measures that are tracked at the initiative level. These initiatives are implemented by other federal agencies that are required to report semiannually to either State's Bureau of Oceans and International Environmental and Scientific Affairs (OES), which oversees five of the CCWG initiatives under our review, or State's Bureau of Energy Resources (ENR), which oversees one of the CCWG initiatives. These reports include information on the results achieved for each relevant State performance measure as well as a narrative describing the initiative's key activities over the reporting period. According to State officials, OES and ENR use this information as inputs to standard Department of State reporting of performance by bureau or for the whole agency; however, CCWG does not use these performance measures to monitor performance at the program level. See appendix III for more information on CCWG's organization and reporting relationships.

CCWG works toward an overarching goal negotiated with China, which is to facilitate constructive U.S.-China cooperation and dialogue on climate change, but does not have program-level performance measures or targets, according to our review of CCWG documents and State officials.

State officials said that CCWG does not have program-level performance measures or targets because the program is viewed as a cooperative effort with China, and it would be difficult to negotiate these elements with the Chinese government. State did not negotiate with the Chinese government the performance measures that it uses at the initiative level, nor does it share the resulting performance information with China, because these are for State's internal use. In addition, because of the initiative-level and other reports, program-level performance information had not seemed necessary to monitor program progress, according to a State official. These reports show that CCWG is making progress from year to year, according to the State official who leads CCWG. However, without program-level performance measures with targets, as suggested by leading practices, CCWG program managers may lack an apt and adequate framework to determine the extent to which the results measured at the initiative level are yielding expected program results and whether any program improvements are needed. The State official who leads CCWG agreed that program-level performance measures and targets could be helpful for learning about CCWG's performance, particularly if the performance measures chosen reflected CCWG's broad goal of working constructively with China on climate change.

DOE Has Taken Steps to Manage IP Risks CERC Participants May Face, but Participants Are Reluctant to Share IP

DOE officials identified potential sharing of background IP—IP generated outside the scope of a research and development collaboration—and participants not having a clear plan for managing IP as risks to U.S. companies and researchers participating in CERC. DOE has taken steps to manage these risks, in part to enable participants to share background IP, which is important for valuable research and development, according to DOE officials. Although CERC participants reported no significant issues with DOE's approach to managing IP risks, companies participating in CERC have been reluctant to share background IP as a part of CERC. As a result, U.S. CERC participants only shared background IP with Chinese organizations for 3 of the more than 80 projects that took place in the first 5-year phase of CERC. DOE officials acknowledged that companies participating in CERC face a tradeoff between the risk of sharing background IP and potential benefits, such as valuable research and development outcomes and gaining a market advantage through demonstrating projects in China.

DOE Has Identified IP Risks CERC Participants May Face and Has Taken Steps to Manage Them

When CERC was first launched in 2009, DOE officials identified potential sharing of background IP and participants not having a clear plan for managing IP as risks to U.S. companies and researchers participating in CERC. DOE officials said that background IP needs to be protected in order for participants to bring their most creative ideas forward to facilitate joint research and development, which is important to the CERC goal of accelerating development and deployment of clean energy technology. According to DOE officials, strong protection of IP encourages innovation by allowing researchers to build on discoveries through lawful means, which accelerates further innovation and enables collaboration. DOE officials and almost all of the CERC participants we interviewed, including the lead organizations of the three tracks and several participants from each track, did not identify any other risks for CERC participants.[31]

DOE has taken steps to manage IP risk to CERC participants, which is in accordance with federal internal control standards for risk assessment.[32]

[31]One participant said that it may also be a risk to be associated with a bilateral government program if the relationship between the two governments becomes strained.

[32]According to federal internal control standards, agencies should assess the risks they face from both internal and external sources and decide how to manage those risks and what actions should be taken. See GAO/AIMD-00-21.3.1.

Specifically, DOE has taken steps to manage IP risks to CERC participants through the following means.

- **The IP Annex to the CERC Protocol**: This part of the CERC founding agreement attempts to help manage IP risk by defining how IP may be shared or licensed in each country. The U.S. Patent and Trademark Office has identified a potential discrepancy between Chinese law and the bilateral U.S.-China Science and Technology Agreement upon which the IP Annex to the CERC Protocol is based, according to U.S. Patent and Trademark Office officials. These officials stated that the potential discrepancy is related to ownership of any improvements made to IP licensed between U.S. and Chinese entities. The U.S. Patent and Trademark Office is discussing the matter with other agencies, including DOE. According to DOE, differences in the laws of the two countries with respect to intellectual property protection were considered and addressed when drafting the IP Annex to the CERC Protocol.[33] In that regard, in order to specify IP rights in greater detail, the IP Annex to the CERC Protocol requires each CERC track to have a Technology Management Plan in place before work on projects can begin.

- **Technology Management Plans**: These plans, which are agreed to by all the participants in a CERC track, are intended to facilitate joint research and development and encourage information sharing by specifying IP rights in greater detail than the IP Annex to the CERC Protocol. According to DOE officials, the Technology Management Plans encourage sharing of background IP to research and development partners by setting up an IP framework in advance of work beginning on projects and making it clear that both governments have endorsed the Technology Management Plans. In addition, the Technology Management Plans state that participants shall negotiate in good faith to provide nonexclusive licenses for IP developed on joint projects with participants in the other country, as well as with third parties who are not participants.[34] According to agency officials,

[33]According to DOE, the IP Annex to the CERC Protocol is a reciprocal binding international commitment for each party to ensure that the IP rights of the other party are allocated in accordance with the IP Annex.

[34]Joint projects involve collaboration between researchers who are employed or sponsored by U.S. members of CERC with those who are employed or sponsored by Chinese members of CERC and/or involve joint funding by the United States and China. Nonexclusive licenses allow for intellectual property to be licensed to more than one licensee.

this has not been the case in previous science and technology agreements between the United States and other countries. According to DOE officials, this provision was important because U.S. CERC participants were interested in being able to license IP to have market access in both countries.

- **IP training workshops**: CERC has conducted five IP training workshops to help participants understand IP sharing under CERC and relevant IP practices and laws in the United States and China. According to DOE officials, these workshops are intended to promote research through cooperation and to encourage participants to share IP, and DOE intends to hold more workshops during the second phase of CERC. DOE also hosted a webcast about IP challenges and opportunities for U.S. organizations doing business in China that it posted on the CERC website.

- **IP guide**: CERC developed an IP guide to assist researchers working on CERC projects. This guide provides a broad overview of IP issues and information specific to CERC, such as information related to how to handle the commercial development of inventions that result from CERC research projects.

- **IP experts group**: DOE encouraged the establishment of an IP experts group to provide pro bono legal assistance to the CERC program. As of November 2015, the IP experts group had 19 U.S. members and 7 Chinese members. Members of the group reviewed and commented on CERC's IP guide and are available to answer IP questions for participants on a limited basis.

DOE officials said these steps have not eliminated all IP risk but that DOE is focused on preemptive IP protection and education for CERC participants, so that the participants can best protect their own IP interests.

CERC Participants Reported No Significant Issues with DOE's Approach to IP, but Participants Are Reluctant to Share IP

CERC participants we interviewed did not report any significant issues with steps DOE has taken to address IP risks. Representatives of 8 of the 12 participating organizations we spoke with about IP issues said the Technology Management Plan was helpful, while others said it had no effect on CERC projects or that they had not had an opportunity to test it. Notably, one participant found the Technology Management Plan helpful in resolving a joint venture negotiation issue. Specifically, the U.S. CERC participant wanted to license technology related to a CERC project to a Chinese company with a nonexclusive license so that it could also license

the technology to other companies in China, while the Chinese company wanted an exclusive license to the technology. According to the participant, the Technology Management Plan was helpful in resolving the issue diplomatically and arriving at the desired agreement. Representatives of 9 of the 12 participating organizations said that there was nothing more that DOE could or should do to address IP risks. One participating software company suggested that CERC could further mitigate IP risks by providing software protection technology to participants. Another participating organization suggested that DOE could request that IP terms be summarized in project proposals, so there could be easy access to understanding how each project is managing IP risks.

Although CERC participants reported no significant issues with DOE's approach to managing IP risks, U.S. companies participating in CERC have been reluctant to share background IP as a part of CERC. U.S. CERC participants shared background IP with Chinese organizations for 3 of the more than 80 projects that took place during the first 5-year phase of CERC, according to a DOE survey of CERC tracks about IP completed in December 2015.[35] The seven companies we spoke with regarding IP issues said that they have their own IP protection strategies in place, and several said they generally considered it a risk to share IP with any other companies that are potential competitors. Representatives of three of the companies mentioned that their companies had additional concerns about IP protection related to working in China for reasons such as a perception that the Chinese legal system will not reliably protect their IP rights.

For its second 5-year phase, at the direction of higher-level management in DOE and DOE's counterpart ministry in China, CERC will make an effort to bring more results to market, according to CERC officials. To that end, CERC is planning to focus more on demonstration projects and other projects that are closer to commercialization. A member of the CERC IP experts group said that IP risk is greater once technology is closer to commercialization because companies have invested more in the technology.

[35]DOE surveyed CERC lead organizations to gather information on the IP accomplishments of each CERC track, such as the number of applications for and grants of patents for CERC project IP and licenses for, or assignments of, background IP for CERC projects.

This greater focus on projects closer to commercialization will continue, and may increase, the importance of sharing background IP during CERC's second 5-year phase. DOE officials said they would like to encourage more sharing of background IP during CERC's second 5-year phase and that through demonstration projects there is more likely to be sharing of background IP; however, according to two CERC participants we spoke with, sharing background IP may not be necessary for some demonstration projects. In addition, we found that participants' willingness to share IP for demonstration projects varies. Specifically, participants in the clean coal track and one participant from the energy efficiency in buildings track said they were interested in demonstration projects and were potentially willing to share, or had shared, IP under CERC. Two participants in the energy efficiency in buildings track said they may be able to demonstrate their products without sharing IP, such as by using technology designed to protect software. However, the representatives of the two companies we spoke with from the clean vehicles track about IP issues said that they were not interested in participating in demonstration projects and that they would not share IP as part of any joint research effort such as CERC.

DOE officials acknowledged that companies participating in CERC face a tradeoff between the risks of sharing background IP and the potential benefits, such as valuable research and development outcomes and gaining a market advantage through demonstrating projects in China. These officials also stated that it is appropriate for companies to assess risks for themselves and not share their most valuable IP if the related risk is determined to be too great. Willingness to share background IP is important for valuable research and development collaboration, but researchers would still be able to engage in work that could prove worthwhile if companies or researchers are unwilling to share their background IP under CERC, according to DOE officials. While not much background IP was shared by U.S. CERC participants during CERC's first phase, U.S. and Chinese CERC researchers exchanged other types of information as inputs to their projects in ways that helped to further their research, according to CERC lead organizations. For example, some of the U.S. and Chinese organizations participating in the clean vehicles track agreed to share battery testing data. Because many batteries must be discharged repeatedly to understand their full life cycle under differing conditions, battery testing can take from months to years; this agreement to share data eliminated months of testing time, according to representatives from the clean vehicles CERC track.

Conclusions

Both the United States and China have committed to efforts to address climate change, including doubling their research and development investments on clean energy. The three U.S. government programs we examined—DOE's CERC, USTDA's East Asia Program, and State's CCWG—are among the mechanisms for cooperating with China to make progress in advancing clean energy technologies. CERC and CCWG officials are in the process of planning the next phases of those programs, and USTDA describes itself as an agency that values the role of data in making program decisions. All three programs realized some results as of the end of 2015 and monitor progress toward their goals by employing a variety of tools, such as performance measures and reporting and evaluation systems. However, we found that all three programs and USTDA for its agency-wide performance measures generally lacked targets, which would enable them to compare the results that they have achieved with the results they had planned to achieve. Not having targets linked to program performance measures limits opportunities to identify potential program improvements and managers' ability to generate and communicate more meaningful performance information. Furthermore, without published agency-wide targets, Congress and the public are unable to compare USTDA's planned and actual performance, which would help them in providing oversight and ensuring the agency's accountability.

Recommendations for Executive Action

1. To improve CERC's performance monitoring, the Secretary of Energy should ensure that for CERC's second phase the program creates targets and tracks progress against those targets in order to measure program performance.
2. To improve the agency's performance monitoring, the Director of the U.S. Trade and Development Agency should develop and make public annual targets for the agency's performance measures.
3. To improve the East Asia Program's performance monitoring, the Director of the U.S. Trade and Development Agency should ensure that the East Asia Program sets targets for its performance measures and tracks progress against those measures.
4. To improve CCWG's performance monitoring, the Secretary of State should ensure that CCWG develops measures and targets at the program level and tracks its performance against those measures and targets.

Agency Comments and Our Evaluation

We provided a draft of this report for review and comment to DOE, State, and USTDA; the Departments of Agriculture, Commerce, the Interior, and Transportation; the Environmental Protection Agency; the Federal Energy Regulatory Commission; and the U.S. Agency for International Development. In their written comments reproduced in appendices IV, V, and VI, DOE, State, and USTDA, respectively, agreed with our recommendations and noted plans to take action to address them. In addition, USTDA reiterated information about its performance monitoring and evaluation processes that we included in our report, such as the target it set for one of its performance measures on federal prime contracts awarded to small businesses, the value of its U.S. export multiplier, and a description of its monitoring and evaluation processes. Furthermore, USTDA indicated that the agency has a target for the amount of U.S. exports generated in fiscal year 2017. We did not include this information in our report because the annual amount of U.S. exports generated agency-wide is not one of USTDA's performance measures specified in its strategic plan.

Commerce, DOE, State, and USTDA also provided technical comments that were incorporated, as appropriate. The other agencies provided no comments.

We are sending copies of this report to the appropriate congressional committees and to the Secretaries of Energy and State; the Director of USTDA; the Secretaries of Agriculture, Commerce, the Interior, and Transportation; the Administrator of the Environmental Protection Agency; the Chairman of the Federal Energy Regulatory Commission; and the Administrator of the U.S. Agency for International Development; and other interested parties. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact Kimberly Gianopoulos at (202) 512-8612 or gianopoulosk@gao.gov, or John Neumann at (202) 512-3841 or neumannj@gao.gov. Contact points

for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VII.

Sincerely yours,

Kimberly Gianopoulos
Director, International Affairs and Trade

John Neumann
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

You asked us to review U.S.-China cooperation on clean energy. This report examines (1) how much funding U.S. agencies have obligated to clean energy cooperation with China; (2) what is known about the results of key U.S.-China cooperation programs and the extent to which these programs follow leading practices in performance monitoring; and (3) the extent to which the U.S. Department of Energy (DOE) manages risks that may face U.S. participants in the U.S.-China Clean Energy Research Center (CERC).

To determine which types of technologies would be related to clean energy, we looked for a U.S. government definition of the term, but found that the U.S. government has no uniform definition of clean energy that is applied government-wide. Instead, based on consultation with participating agencies and review of the White House's June 2013 Climate Action Plan, we have determined that the following types of energy technologies are relevant for this review: renewable energy (including solar, wind, hydro, geothermal, and biofuels); energy efficiency technologies (i.e., technologies that decrease the intensity of energy usage); nuclear power; natural gas; clean coal (e.g., coal with carbon capture/sequestration); clean vehicle technologies; and improved energy infrastructure (e.g., smart grids).

To describe the funding amounts that U.S. agencies have obligated to clean energy cooperation with China, we first took steps to determine the agencies involved in and providing funding to these efforts. To identify these agencies, we analyzed publicly available information on agency websites and outcome statements from two key annual meetings between the United States and China: the U.S.-China Strategic and Economic Dialogue and the Joint Commission on Commerce and Trade. In addition, when meeting with agencies that we had identified as involved in U.S.-China clean energy cooperation, we asked them which other agencies they worked with in this cooperation. We identified 10 agencies involved: (1) the Department of Commerce, (2) DOE, (3) the Department of the Interior, (4) the Department of State (State), (5) the Department of Transportation, (6) the Environmental Protection Agency, (7) the Federal Energy Regulatory Commission, (8) the U.S. Agency for International Development, (9) the Department of Agriculture, and (10) the U.S. Trade and Development Agency (USTDA).[1]

[1]We had also initially identified the Department of the Treasury and the Nuclear Regulatory Commission as potentially involved in U.S.-China clean energy cooperation, but after meeting with them we learned that they were not active in this cooperation during the period of fiscal years 2008 through 2015.

To determine which of these agencies obligated funds to U.S.-China clean energy cooperation and the amounts obligated in fiscal years 2008 through 2015,[2] we sent a data collection instrument to all involved agencies that asked them to identify, among other items, the agencies' U.S.-China clean energy cooperative activities; a description of each activity, including its purpose and the type(s) of clean energy it focused on; identification of the type of activity (e.g. joint research and development, trade mission, forum for technical discussion, feasibility study, regulatory cooperation, technical assistance, other); other agencies participating in the activity; the amount of funding obligated to each activity by fiscal year; the appropriations funding account used for such obligations; and the source of that information.[3] Upon receipt of the agencies' responses, we took multiple steps to ensure that responses were complete, including comparing all responses against each other to determine if activities were reported by one agency but not others that also participated in the activity, comparing responses against other agency documentation describing U.S.-China clean energy cooperative efforts, and following up with the agencies to ask for clarifications regarding any activities that seemed that they may have been missing. We also sent each agency a set of questions to help determine the reliability of the sources of the data and to ensure that the agencies considered the information provided as a complete and accurate characterization of their agency's participation in and funding of U.S.-China clean energy cooperation. Our analysis of these responses showed there were some activities that had been reported but for which the funding was not solely for the purpose of clean energy cooperation with China. For example, funding may have gone to multiple countries or have been also used for other purposes. In cases where agencies were unable to separately identify the funding for clean energy cooperation with China,

[2]We chose to begin our scope with fiscal year 2008 because that was the year in which the United States and China established the Ten Year Framework for Cooperation on Energy and Environment.

[3]The agencies provided this information from various government databases and source documentation. DOE funding information was from sources including its Standard Accounting Reporting System and the Office of Energy Efficiency and Renewable Energy's Corporate Planning System; Federal Energy Regulatory Commission funding information was from travel databases; U.S. Agency for International Development funding information was from the agency's Phoenix accounting system; and USTDA funding information was from the Trade and Development Agency Management Information System. The Departments of Commerce, State, and Transportation provided funding information based on source documentation such as interagency agreements, travel vouchers, and travel budgets.

we excluded those activities and their funding from our analysis. After taking these steps, we determined that the data provided are sufficiently reliable for our purpose of identifying U.S.-China clean energy cooperation efforts and their obligated funding in fiscal years 2008 through 2015. We then analyzed these data by agency, by key programs, by fiscal year, by type of activity, and by type of clean energy to be able to describe the uses of funding provided to U.S.-China clean energy cooperation.

To describe what is known about the results of U.S.-China clean energy cooperation, we focused on the programs that received the largest amount of funding from each of the three agencies that provided the most funding to U.S.-China clean energy cooperation. The key programs we identified were DOE's CERC program, USTDA's East Asia Program, and State's U.S.-China Climate Change Working Group (CCWG). Both USTDA's East Asia Program and State's CCWG program have some aspects not related to China or clean energy. For our report, we limited our analysis of program results to those aspects of the programs related to clean energy cooperation with China. However, for our analysis of these programs' performance monitoring, we looked at the whole programs because the same monitoring processes were followed for all aspects of the programs.

We analyzed the results of the three key clean energy programs.

- To describe the results that CERC yielded as of December 31, 2015, for its 19 key performance measures, we discussed with agency officials which performance measures could be aggregated across the years of CERC's first phase—2011 to 2015. CERC has 12 key performance measures that can be aggregated to show total results for that time period. Of those 12 performance measures, we excluded 3 measures related to funding and cost-share because those are related to inputs and not program results. We determined the results for the remaining 9 performance measures based on agency documentation. To illustrate different types of results, we also selected examples of nonquantifiable key outcomes as reported by CERC for each of the three program tracks from lists of outcomes that DOE considers most important.

- To describe the export results generated by the 24 USTDA East Asia Program projects in our review as of the end of fiscal year 2015, we analyzed project documents for reported export outcomes and compared those data to information provided by USTDA from its internal database. We calculated the export multiplier for these

projects using USTDA's formula of dividing the total amount of exports by the amount obligated for these projects. We also judgmentally selected examples of USTDA's development impacts from our review of project documents to illustrate different types of development impacts.

- To describe the results of the six CCWG initiatives in our review as of the end of fiscal year 2015, we examined the interagency agreements between State and the agencies implementing the initiatives. These agreements establish the performance measures and targets for each initiative. We obtained results data for each performance measure from the agencies' performance reporting to State. We then aggregated the targets and results across the six initiatives for each performance measure.

To assess the reliability of the results data, we reviewed agency documents, including an external audit of one agency's data system; to the extent possible, cross-checked results information that was reported in multiple documents; and interviewed agency officials regarding how they validate their data. We determined that the data are sufficiently reliable for describing the results of USTDA's East Asia Program and CCWG through fiscal year 2015 and CERC's results through December 2015.

To describe how DOE, USTDA, and State monitor the performance of CERC, the East Asia Program, and CCWG, respectively, we analyzed documents from each agency such as evaluation manuals, contracts, and performance reports. We also interviewed knowledgeable officials from each agency to discuss their processes for monitoring program performance. The GPRA Modernization Act of 2010 (GPRAMA) requires agencies to have a performance plan that, among other things, contains performance measures with established targets that can be used to assess progress toward achieving those targets.[4] GPRAMA also requires that agencies make public their performance plans containing information on their goals and performance measures.[5] Furthermore, linking goals to performance measures that are tracked against established targets is a

[4]31 U.S.C. § 1115(b).

[5]GPRAMA requires that agency performance plans describe how their performance measures with established targets contribute to the general goals and objectives established in the agency's strategic plan. 31 U.S.C. § 1115(b)(3)(A).

leading practice for federal programs.[6] To examine whether the three agencies followed these leading practices to measure their programs' performance, we reviewed agency planning and performance reporting documents to determine whether they contained goals, performance measures, and targets. We then confirmed our analysis by meeting with officials from each program to discuss whether the programs had goals linked to performance measures with established targets, as well as whether USTDA had these elements agency-wide.

We conducted fieldwork at the locations of the CERC lead organizations in West Virginia, Michigan, and California in November and December 2015 to interview representatives of the CERC lead organizations, other CERC participants, and CCWG participants to collect information on results and reporting. Also, during these interviews with CERC participants and others conducted by phone, we discussed the potential benefits and risks of participating in CERC and DOE's management of risks. In addition to management and researchers at the three CERC lead organizations, we interviewed representatives from a nonprobability sample of 10 other organizations that have participated in CERC. Specifically, we interviewed representatives of three participants in the clean vehicles track, four participants in the clean coal track, and three participants in the energy efficiency in buildings track. These participants included eight private companies, one university, and one national lab that participate, or have participated, in CERC. One private company did not comment on IP because it did not participate in a research project with China, so that company is not included in our analysis of IP issues. We selected these CERC participants using criteria such as type of organization, current or former participant, amount of involvement in CERC, and proximity to a CERC lead organization we were visiting. Because we selected a nonprobability sample, the information obtained from these interviews is not generalizable to other CERC participants, but it provides illustrative information. During the site visits, we also interviewed four CCWG participants to learn more background on this program. These participants were selected based on proximity to a CERC lead organization we were visiting. For CCWG, we also interviewed

[6]GPRAMA requirements can serve as leading practices at lower levels within federal agencies, such as programs, as we have previously reported in GAO, *Diesel Pollution: Fragmented Federal Programs That Reduce Mobile Source Emissions Could Be Improved*, GAO-12-261 (Washington, D.C.: Feb. 7, 2012) and *Environmental Justice: EPA Needs to Take Additional Actions to Help Ensure Effective Implementation*, GAO-12-77 (Washington, D.C.: Oct. 6, 2011).

officials from the agencies implementing all six of CCWG's clean energy initiatives through 2015, including DOE, the Department of Transportation, and the Environmental Protection Agency.

To determine what risks, if any, U.S. companies and researchers participating in CERC may face, we analyzed relevant documents and conducted multiple sets of interviews. We reviewed documents from the Office of the United States Trade Representative and the U.S. Patent and Trademark Office that describe IP issues and other risks related to doing business in China. In addition to interviewing CERC participants and DOE officials, we interviewed eight individuals we learned to be knowledgeable about U.S.-China cooperation on clean energy to get their perspective on the potential IP risks for CERC participants and, in some instances, the steps DOE has taken to address those risks. To determine the extent to which DOE has taken steps to manage these risks, we identified the risk management steps DOE has taken and then compared these steps to federal internal control standards for risk assessment, which state that agencies should assess the risks the agency faces from both internal and external sources and decide how to manage those risks and what actions should be taken.[7] Specifically, we analyzed relevant documents, including the CERC Protocol and IP Annex, the Technology Management Plan for each CERC track, the CERC "Researchers' Guide to IP and Technology Transfer," and the results of a CERC IP survey. We directed clarifying questions about the IP survey to DOE officials and a CERC participant and determined that the survey information is accurate and reliable for our purposes. We also interviewed knowledgeable DOE officials to understand what steps DOE took to identify and respond to any risks that U.S. participants in CERC may face, and we interviewed CERC participants to get their feedback on the effectiveness of these steps.

We conducted this performance audit from June 2015 to July 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

[7]GAO, *Standards for Internal Control in the Federal Government*, GAO/AIMD-00-21.3.1 (Washington, D.C.: November 1999).

Appendix II: Appropriations Accounts Used for Bilateral Cooperation with China on Clean Energy

The seven U.S. agencies that obligated funding to U.S. participation in bilateral cooperation with China on clean energy in fiscal years 2008 through 2015 did so using funding from a variety of appropriations accounts. Table 3 provides a list of those accounts.

Table 3: Appropriations Accounts Used in Fiscal Years 2008–2015 for Bilateral Cooperation with China on Clean Energy, By Agency

Department of Commerce
International Trade Administration, Operations and Administration
Department of Energy
Environmental and Other Defense Activities, Defense Environmental Cleanup
Energy Programs, Departmental Administration
Energy Programs, Energy Efficiency and Renewable Energy
Energy Programs, Fossil Energy Research and Development
Energy Programs, Nuclear Energy
Energy Programs, Science
Department of State
Administration of Foreign Affairs, Diplomatic and Consular Programs
Bilateral Economic Assistance, Funds Appropriated to the President, Economic Support Fund
Department of Transportation
Federal Aid Highways (Liquidation of Contract Authorization) (Highway Trust Fund)
Federal Energy Regulatory Commission
Federal Energy Regulatory Commission, Salaries and Expenses
U.S. Agency for International Development
Bilateral Economic Assistance, Funds Appropriated to the President, Development Assistance
U.S. Trade and Development Agency
Export and Investment Assistance, Funds Appropriated to the President, Trade and Development Agency

Source: GAO analysis of agency data. | GAO-16-669

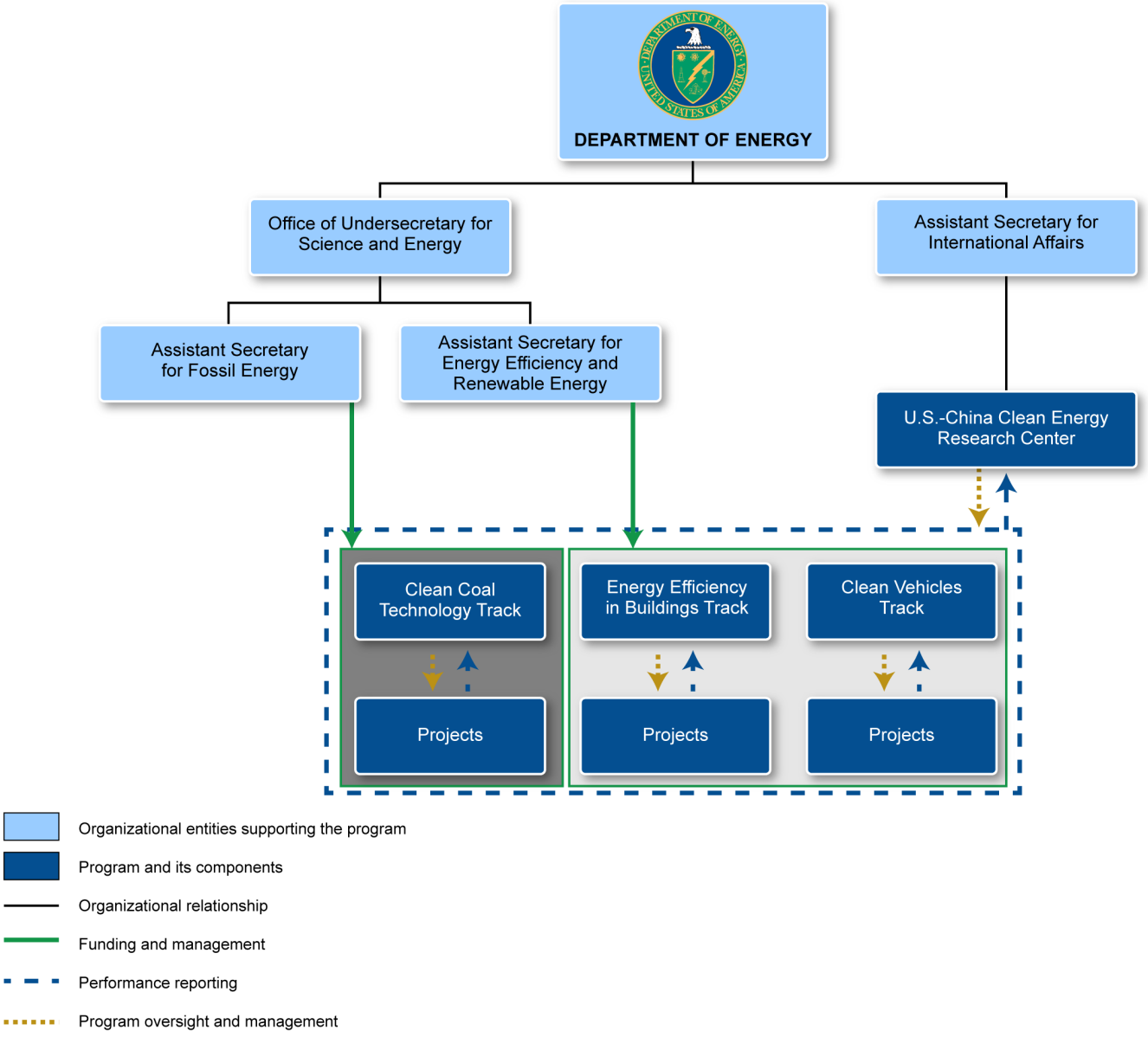
Note: Obligations for bilateral cooperation with China on clean energy were not made from some of these accounts in each fiscal year from 2008 to 2015.

Appendix III: Key U.S.-China Clean Energy Cooperation Programs' Organization and Reporting Relationships

The following figures show the organizational and reporting relationships for the three key U.S.-China clean energy programs: the Department of Energy's U.S.-China Clean Energy Research Center (CERC), the U.S. Trade and Development Agency's (USTDA) East Asia Program, and the Department of State's U.S.-China Climate Change Working Group (CCWG).

Figure 5 shows how CERC fits within the Department of Energy, including where CERC tracks get their funding, responsibilities for program oversight, and performance reporting channels.

Figure 5: U.S.-China Clean Energy Research Center Organizational and Reporting Relationships

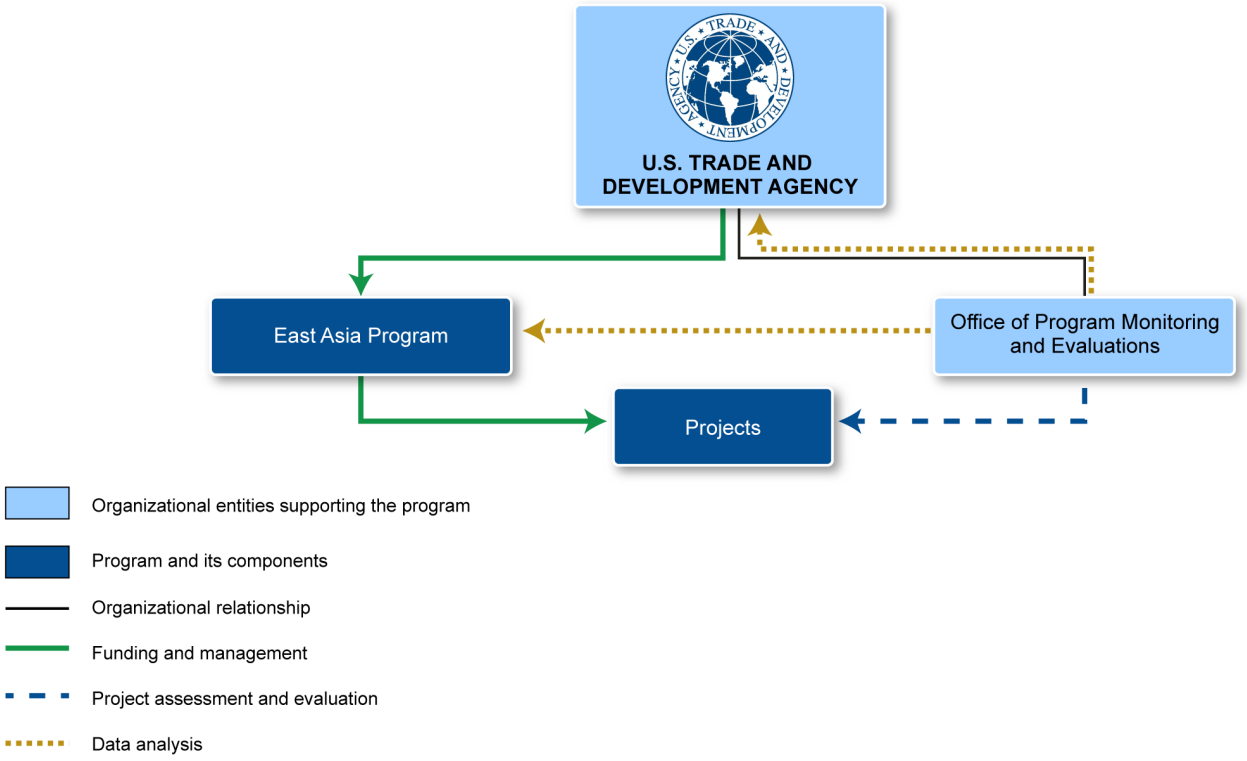


Source: GAO analysis of Department of Energy documents and interviews with agency officials. | GAO-16-669

Note: This figure depicts organizational and reporting relationships for the U.S. portion of the U.S.-China Clean Energy Research Center.

Figure 6 shows how the USTDA East Asia Program fits within USTDA, including where the East Asia Program's projects get their funding, responsibilities for program oversight, and data analysis and performance reporting channels.

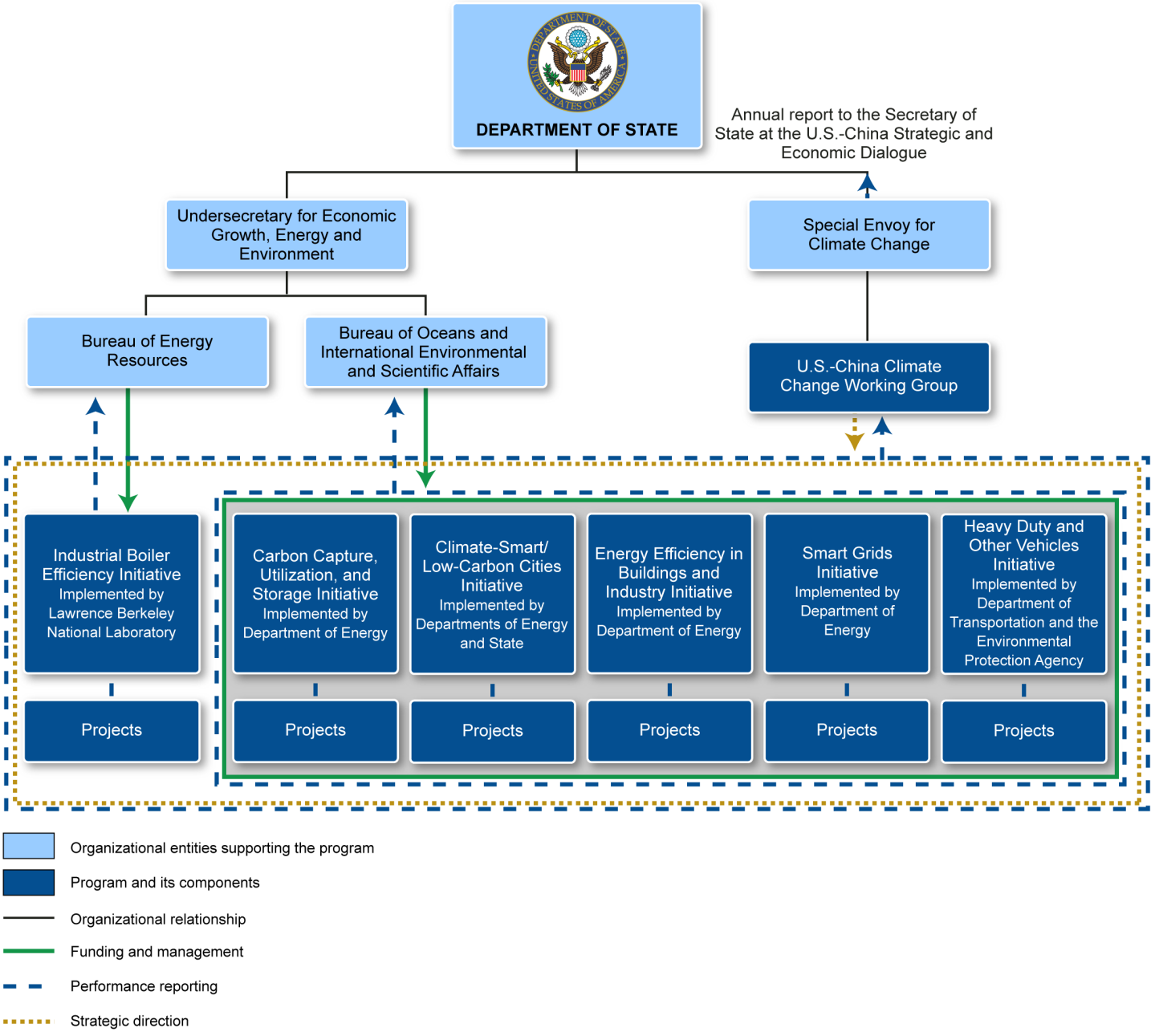
Figure 6: U.S. Trade and Development Agency's East Asia Program Organizational and Reporting Relationships



Source: GAO analysis of U.S. Trade and Development Agency documents. | GAO-16-669

Figure 7 shows how CCWG fits within the Department of State, including where the CCWG initiatives get their funding, responsibilities for program oversight and strategic direction, and performance reporting channels.

Figure 7: U.S.-China Climate Change Working Group Organizational and Reporting Relationships



Source: GAO analysis of Department of State documents and interviews with agency officials. | GAO-16-669

Note: This figure depicts organizational and reporting relationships for the U.S. portion of the U.S.-China Climate Change Working Group and its clean energy initiatives.

Appendix IV: Comments from the Department of Energy

Department of Energy
Washington, DC 20585

June 13, 2016

Mr. Gene L. Dodaro
Comptroller General of the United States and
Head of the U.S. Government Accountability Office
United States Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Mr. Dodaro:

Thank you for the opportunity to review the Government Accountability Office's (GAO's) draft report entitled "U.S.-China Cooperation: Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring" (GAO-16-669). We find it a reasonable accounting of the identified U.S. Department of Energy's (DOE's) cooperative activities with China. I commend the GAO for the thoroughness of its research in this case.

Regarding the U.S.-China Clean Energy Research Center (CERC), we are pleased to note that GAO found CERC to have overarching goals and metrics for measuring progress. We agree with GAO's recommendation that CERC should establish targets for such goals going forward. In the beginning, CERC was an uncertain first-of-a-kind bilateral endeavor. Now that we have had 5-years of experience, we are prepared to define and set Government Performance and Results Act (GPRA)-compliant targets for the next 5-year performance period.

We are also pleased that GAO reported on a range of outcomes and research results of technical significance, which are summarized in Table 1 on page 14. Also noted are outcomes that extend beyond research, evidencing the beneficial intersection of science and diplomacy. In this case, science, in the form of collaborative research on clean energy technology, has helped to nurture a U.S.-China relationship that has advanced diplomatic cooperation on larger matters of common interest in energy, environment, climate and trade.

Both the United States and China recognize the vital importance of secure, affordable and clean energy. As the two largest producers and consumers of energy and the two largest greenhouse gas emitters, each country has much to gain by working together. By leveraging intellectual, scientific and other resources under well-supervised collaborative arrangements, such as CERC, we can accelerate the pace of innovation and solve common problems faster, cheaper and better.

Thank you for the opportunity to review and comment on GAO's draft report.

Sincerely,

Jonathan Elkind
Assistant Secretary
Office of International Affairs

Appendix V: Comments from the Department of State

United States Department of State
Comptroller
Washington, DC 20520

JUN 15 2016

Dr. Loren Yager
Managing Director
International Affairs and Trade
Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Dr. Yager:

We appreciate the opportunity to review your draft report, "U.S.-CHINA COOPERATION: Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring." GAO Job Code 100123.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Joseph DeTellis, Congressional Affairs Officer, Bureau of Oceans and International Environmental and Scientific Affairs at (202) 647-6958.

Sincerely,

Christopher H. Flaggs

Enclosure:
As stated.

cc: GAO – Kimberly Gianopoulos
OES – Judith G. Garber (Acting)
State/OIG - Norman Brown

Department of State Comments on GAO Draft Report

U.S.–CHINA COOPERATION: Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring
(GAO-16-669, GAO Code 100123)

Thank you for the opportunity to comment on the GAO draft report *U.S.-China Cooperation: Bilateral Clean Energy Programs Show Some Results but Should Enhance Their Performance Monitoring.*

The Department of State greatly appreciates GAO's evaluation of our clean energy cooperation with China. With respect to recommendation four, which addresses improvements in the Climate Change Working Group's (CCWG) performance monitoring, we agree that the CCWG would benefit from the development of measures and targets at the program level to better track performance against the planned results. We concur with the recommendation. As we begin the next phase of program planning, we will work to establish measurable targets to measure results achieved against the planned results.

However, while recognizing and agreeing that CCWG program-level performance measures and targets would improve the evaluation of progress across the program, we are concerned that the GAO report as written understates that broader importance of U.S.-China leadership and cooperation on climate change, especially through the CCWG. On June 9, 2016 , the United States and China publicly released the annual report of the U.S.-China Climate Change Working Group (http://www.state.gov/e/oes/rls/rpts/258282.htm). The report was presented to the four Special Representatives of the U.S.-China Strategic and Economic Dialogue (Secretaries Kerry and Lew of the United States, and State Councilor Yang Jiechi and Vice Premier Wang Yang of China) and approved at the Joint Session on Climate Change – one of the only joint sessions held annually at the S&ED. Noting that climate change has become a pillar of the U.S.-China bilateral relationship, the report details the robust cooperation and dialogue on climate change the two countries are implementing across multiple sectors of the economy, engaging a broad array of interagency actors at the federal and local levels as well as with civil society, academia, and the private sector. The report notes that, over the past few years, expanded dialogue and cooperation have heralded a new era of climate leadership by the world's two largest economies and greenhouse gas emitters. The annual CCWG report also highlights that U.S.-China climate leadership was a major contributor to the success of the historic December 2015 Paris Agreement.

We appreciate GAO's work in this area and its recommendations for the U.S. government's bilateral clean energy programs with China, and thank you again for the opportunity to comment on the draft report.

Appendix VI: Comments from the U.S. Trade and Development Agency

U . S . T R A D E A N D D E V E L O P M E N T A G E N C Y

June 16, 2016

Ms. Kimberly Gianopoulos
Director, International Affairs and Trade
441 G Street, NW
General Accountability Office
Washington, D.C. 20548

Mr. John Neumann
Director, Natural Resources and Environment
441 G Street, NW
General Accountability Office
Washington, D.C. 20548

Dear Ms. Gianopoulos and Mr. Neumann:

Thank you for the opportunity to review and comment on this draft report. The U.S. Trade and Development Agency appreciates the Government Accountability Office's thoughtful and thorough review of USTDA's clean energy program in China and its efforts to support the export of U.S.-manufactured clean energy goods and services to China.

We would like to take this opportunity to reiterate important information that USTDA provided to GAO in the course of compiling the report.

USTDA provides Agency-wide performance targets to Congress and the public

Each year, USTDA provides Congress and the Office of Management and Budget (OMB) its Performance and Accountability Report, Annual Report and Congressional Budget Justification. These materials, all of which are publicly available on USTDA's website, contain important performance targets.

Consistent with its mandate to "promote United States private sector participation in development projects in developing and middle-income countries, with special emphasis on economic sectors with significant United States export potential,"[1] USTDA's primary strategic goal is to create U.S. jobs by supporting exports of U.S. goods and services for priority development projects in emerging economies. In USTDA's FY 2017 Congressional Budget Justification, the Agency set a target, based upon receipt of its requested appropriation, for its program to generate $5.97 billion in U.S. exports.

In addition, as stated in GAO's draft report, USTDA established a goal of exceeding the Small Business Administration's benchmark of 23 percent of federal prime contracts awarded to U.S. small businesses. In the Agency's FY 2015 Performance and Accountability Report, USTDA reported that more than 52 percent of the total value of all prime contracts awarded by USTDA went to small businesses.

[1] 22 U.S.C. § 2421(a).

1000 WILSON BOULEVARD, SUITE1600, ARLINGTON, VA 22209-3901 • 703.875-4357 • Fax: 703.875.4009 • WWW.USTDA.GOV

USTDA promotes transparency and accountability for its programs through numerous public reports

USTDA publishes critical information that allows Congress and the public to oversee the Agency and hold it accountable. Annually, USTDA releases its audited financial statements, a list of every activity the Agency has funded during the previous year, and its current export multiplier, which measures the U.S. exports generated from every dollar USTDA invests.

The Agency is proud of its performance and has every incentive to share its results widely. USTDA's export multiplier has increased from $35 in 2008 to $74 in 2015. Last fiscal year alone, the Agency "identified $11.8 billion in new U.S. exports supporting 68,392 new U.S. jobs as a result of USTDA's funding."[2]

USTDA has robust evaluation processes that track and improve the Agency's performance

USTDA uses data and measures results to track and improve the Agency's performance. USTDA documents the link between specific Agency-funded activities and final project outcomes using several indicators that accurately capture the benefits delivered to U.S. companies, overseas project sponsors and host country economies as a result of Agency-funded activities. This performance data is validated by independent evaluation contractors and is made available regularly to Congress and the public through numerous public reports. The Agency's use of data to prioritize its investments has helped to ensure an increased export multiplier for the Agency and U.S. taxpayers. The doubling of USTDA's key performance metric is in large measure correlated to the evaluations processes that provide USTDA staff and leadership detailed information about what is successful and what needs to be adjusted in order to improve the Agency's performance.

USTDA's response to GAO recommendations

In order to address GAO's recommendations, USTDA will revise the Agency's five-year strategic plan and annually publish the corresponding metrics, which will ensure both USTDA and the public can evaluate and measure Agency-wide performance based on established criteria. USTDA will also review – and adjust as necessary – each of the region's goals during its strategic planning process and evaluate each of its investment decisions accordingly. This will enable the Agency to continue to identify ways to strengthen its ability to deliver developmental impacts abroad and to increase U.S. exports and support job creation at home.

Again, thank you for the opportunity to review and comment on the draft report. Please feel free to contact me at 703-875-4357 if you have any questions.

Sincerely,

Leocadia I. Zak
Director

[2] USTDA's FY 2015 Performance and Accountability Report, available at: https://www.ustda.gov/sites/default/files/pdf/about/reports/FY2015AuditedFS.pdf.

Appendix VII: GAO Contacts and Staff Acknowledgments

GAO Contacts

Kimberly Gianopoulos, (202) 512-8612 or gianopoulosk@gao.gov
John Neumann, (202) 512-3841 or neumannj@gao.gov

Staff Acknowledgments

In addition to the contacts named above, Kim Frankena (Assistant Director), Karla Springer (Assistant Director), Heather Latta (analyst in charge), David Dayton, Rachel Girshick, Marya Link, and Dina Shorafa made key contributions to this report. Jill Lacey, Lisa Pearson, Sara Sullivan, and Alex Welsh provided technical assistance.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's website (http://www.gao.gov). Each weekday afternoon, GAO posts on its website newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to http://www.gao.gov and select "E-mail Updates."

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, http://www.gao.gov/ordering.htm.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

Connect with GAO

Connect with GAO on Facebook, Flickr, Twitter, and YouTube.
Subscribe to our RSS Feeds or E-mail Updates.
Listen to our Podcasts and read The Watchblog.
Visit GAO on the web at www.gao.gov.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Website: http://www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Katherine Siggerud, Managing Director, siggerudk@gao.gov, (202) 512-4400, U.S. Government Accountability Office, 441 G Street NW, Room 7125, Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548