Unleashing Energy Efficiency Retrofits Through Energy Performance Contracts in China and the United States

U.S.-China Energy Performance Contracting Webinar

April 29, 2015

Background

- Last November's joint announcement by Presidents Obama and Xi set aggressive climate mitigation targets. The joint U.S.-China work on the Energy Performance Contracting (EPC) initiative is a great way to help ensure these targets are met.
- Significant EPC markets in both countries and huge potential for growth
- **U.S. ESCOs:** Revenue of over $5 billion per year in a dynamic and competitive environment, where new business models and financing solutions are being developed to address a variety of long-standing barriers
- **China ESCOs:** Incredible growth, with investment reaching $12 billion in 2013 and projected to reach at least $17 billion by 2020

Overview of EPC Initiative

- In April 2013, the United States and China announced a Climate Change Action Plan for new climate-related collaboration.
- Bilateral initiative focusing on promoting Energy Performance Contracting (EPC) under the Climate Change Working Group (CCWG).
- Purpose: Facilitate the deployment of deep energy savings, multi-technology retrofits of buildings in China and the United States.
- Two Phases of Implementation Plan: U.S. and China sides have been collaborating for over a year on Phase I of the initiative, executing deliverables that lay ground work for implementation in Phase II.

China and U.S. Collaborators

China Collaborators:

- China National Development Reform Commission, Resources Conservation and Environmental Protection (NDRC), and
- China's ESCO association, the ESCO Committee of China Energy Conservation Association (EMCA)

U.S. Collaborators:

- U.S. Department of State, Bureau of Energy Resources (ENR) and the Office of the Special Envoy for Climate Change (SECC) (collectively, State),
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy's (EERE's) International Team (DOE), and
- DOE's Implementing National Laboratories: Pacific Northwest National Laboratory (PNNL) and the Lawrence Berkeley National Laboratory (LBNL)

Phase I: Implementation Plan Deliverables

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Phase I Deliverables under Implementation Plan:

- **Market Opportunity Analysis White Paper**: outlines the markets, trends, resources, challenges and opportunities for EPC in both countries
- **EPC Toolkit**: resources to foster EPC projects resources (e.g. model contract templates, cost calculators, protocols);
- **Policy Recommendations Report**: EPC-supportive policy proposals that could be adopted by government officials; and
- **Pilot Project Criteria**: Minimum requirements for opportunity for recognition at the U.S.-China Energy Efficiency Forum

Timeline of Events

- **January 2014:** Implementation plan for EPC initiative agreed by United States and China
- **February 2014:** Phase I work commences, starting with the Market Opportunities Analysis in the U.S. and China markets
- **June 2014:** U.S.-China Energy Efficiency Forum, debuting and seeking industry feedback on Market Opportunities Analysis and prospect of industry-led working group
- **July to December 2014:** Completion of Phase I deliverables, including EPC toolkit, pilot project criteria and policy recommendations report
- **January 2015:** EPC Symposium in Beijing hosted by EMCA, DOE and DOS during EMCA's annual meeting, seeking input from nearly 100 U.S. and China practitioners on Phase I deliverables
- **February to March 2015:** Finalization of deliverables based on industry feedback from U.S. and China sides and further development of industry-led working group, as strongly endorsed at EPC Symposium

Key Dates to Remember

- **April 29, 2015:** Announcement of Pilot Project Opportunity and Phase II implementation begins
- **May 7, 2015:** U.S.-China Energy Cooperation Program (ECP) and EMCA launch in Beijing an industry-led EPC working group to foster U.S.-China company relationships and develop new business models for conducting EPC projects
- **August 3, 2015:** Deadline for Submission of Pilot Project MOUs for recognition opportunity
- **September 2015:** U.S.-China Energy Efficiency Forum in DC

Today's Agenda and Questions?

Agenda:

11:00-11:10	Overview of EPC Initiative – Ruth Ku, State/ENR, Senior Energy Finance Advisor
11:10-11:15	Market Opportunity Analysis – Meredydd Evans, PNNL, Senior Staff Scientist
11:15-11:20	EPC Toolkit – Sha Yu, PNNL, Senior Research Scientist
11:20-11:25	Policy Recommendations – Bo Shen, LBNL, Principal Scientific Engineering Associate
11:25-11:40	**Q&A on above presentations**
11:40-11:50	Pilot Project Opportunity – Ruth Ku, State/ENR, Senior Energy Finance Advisor
11:50-12:00	Industry-Led EPC Working Group – Clay Nesler, Johnson Controls, Inc., Vice President
12:00-12:30	**Q&A on everything above**

We want to hear from you. Please submit your questions!

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Market Opportunity Analysis: Unleashing Energy Efficiency Retrofits Through Energy Performance Contracts in China and the United States

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In Cooperation with
ESCO Committee of China Energy Conservation Association (EMCA)

China EPC Market Overview

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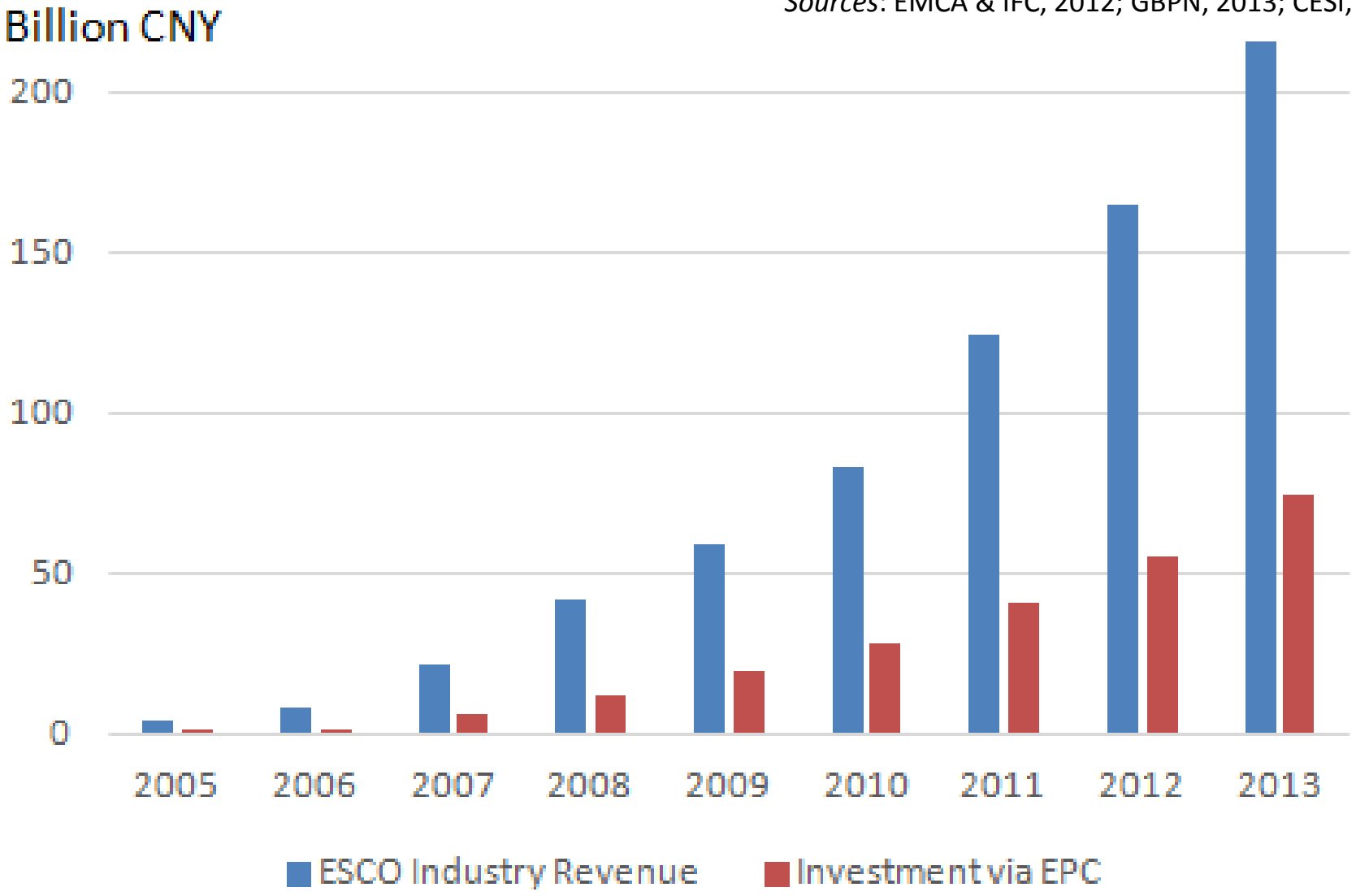
Sources: EMCA & IFC, 2012; GBPN, 2013; CESI, 2014



Major Barriers

- Lack of access to third-party investment and shortage of financing options
- Lack of M&V protocols for addressing integration of multiple technologies and lack of M&V capacity
- Creditworthiness
- Incentives offered for shared-saving, excluding other contract models
- Lack of standardized contracting protocols for different business models
- Fragmented market, lack of project bundling
- Complicated building ownership and management
- Lack of incentives to implement EPC in public sector

Current Market in the United States

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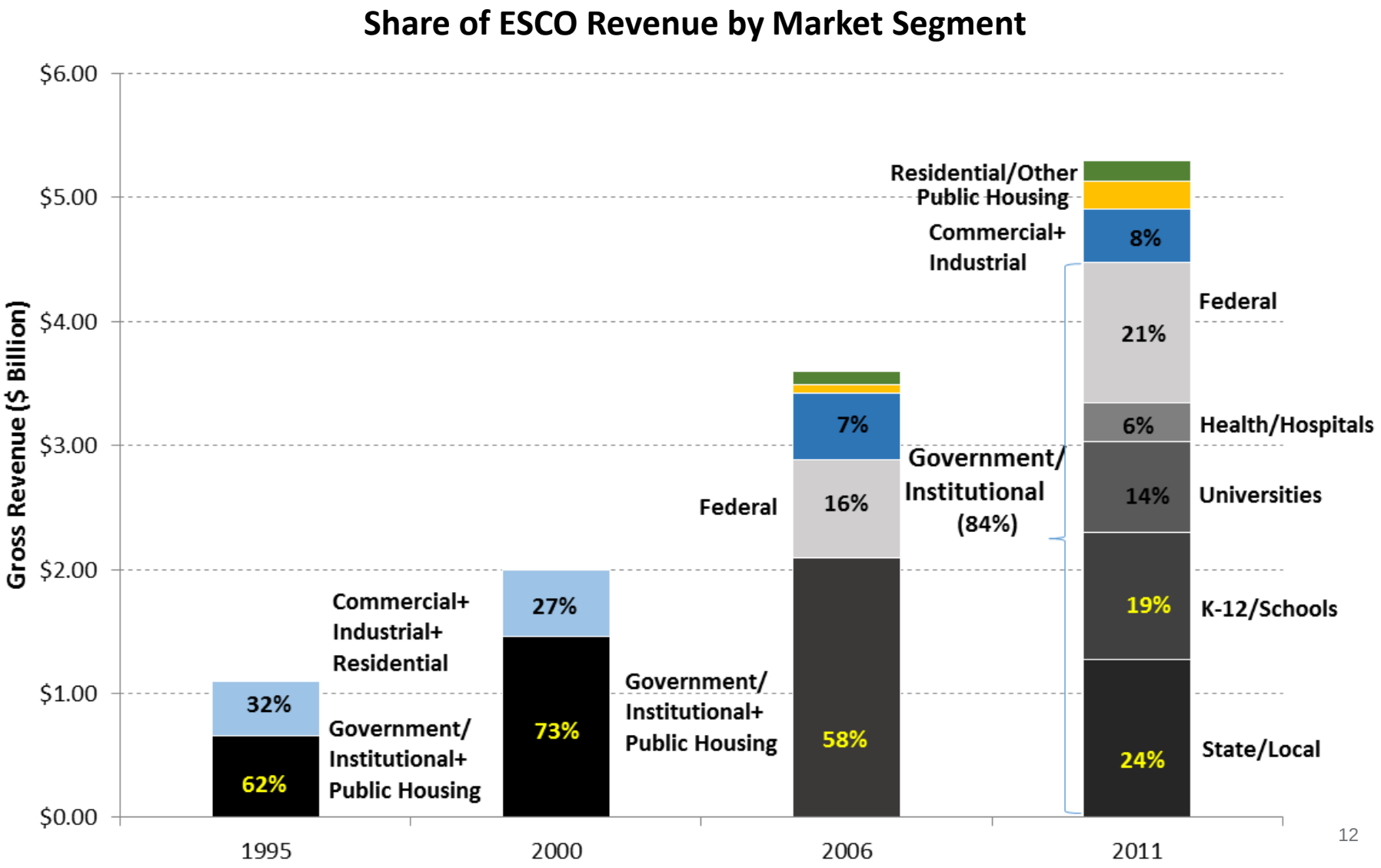

Growth Drivers in the U.S. ESCO Market

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Drivers	Importance
Guaranteed savings	• Lower transaction costs for M&V disputes • Clear payment schedule makes budgeting and financing easier
Third-party financing	• Allows ESCOs to take on more projects
Model contracts and SuperEPCs	• Reduce bureaucracy of signing EPCs • Lower transaction and interest costs • Increase access to financing
M&V protocols	• Document results and business case • Increase access to financing and lower interest rates
Public efficiency requirements	• Increase demand for energy efficiency services
Tools and support	• Lower transaction costs • Increase innovation and capacity

Comparison of U.S. and China EPC Markets

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Indicators	China	U.S.
EPC investments 2013*	$11.98 billion	$7.62 billion
Dominant market segment	Industry (82%)	Government and institutional (84%)
Dominant contract type for EPCs	Shared-savings	Guaranteed savings
Typical project size	$100,000-$1,000,000	$2 million-$15 million
Number of measures involved in EPC project, typically	Selected and specialized, less integrated	Multiple and integrated
Typical contract term	4-8 years	10-20 years
Thrust of government support for EPCs	▪ Energy saving targets at national, sub-national, sector and enterprise level; ▪ Tax exemptions and financial rewards targeting shared savings projects; ▪ Technical assistance via training and best practices.	▪ Energy saving targets and procurement rules for public sector projects; ▪ Extensive technical assistance via tools, best practices, and trainings; ▪ Utility energy efficiency portfolio standards at state level.
Typical financing arrangements	ESCO provides financing from its own capital and, increasingly, by taking out a loan. Some ESCOs are exploring more innovative financing arrangements such as leasing.	Customer finances with loan, lease, bond, or (in some cases) financing structured as operating expenses. Many different financing mechanisms for different contract structures.
Standardized contracts and M&V protocols	National standards on contracting and M&V with a focus on shared savings contracting model. Lack of a comprehensive M&V protocol that covers integration of multiple measures.	Standardized, stakeholder-developed contract models and detailed M&V guidance.

* EPC investments in this table include financing-related costs.

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Existing and Potential Resources for EPC Projects in China and the United States

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ESCO Committee of China Energy Conservation Association (EMCA)

Comparison of Tools in China and the U.S.

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- **China tools**
  - More generic
  - Industry sector-focused
  - Developed through proprietary research or collaboration among universities, research institutions and companies
  - Training resources are typically on a fee basis

- **U.S. tools**
  - Specific and detailed
    - Public sector-focused
    - Developed by U.S. Department of Energy (DOE) national laboratories, contractors, ESCOs, companies and collaborative efforts
  - Abundance of free training resources (esp. for public sector), but also tailored courses for a fee

Types of Tools

- Project development
  - Project development protocols
  - Model contracts
  - Project scoping software
  - Building simulation and analysis software
  - Auditing resources
  - Economic assessment resources
  - Technology selection
  - Financing resources
- Project implementation
  - Project commissioning resources
  - Measurement and Verification (M&V)
  - Operation and maintenance
- Training and databases
  - Education and training
  - Project databases

Potential for Tool Transfer For China

- ***Project development protocols***: develop more types of protocols for various sectors
- ***Model contracts***: offer more detailed model contracts covering a wider range of contracts and sectors
- ***Energy auditing***: offers more comprehensive auditing software with multiple scenarios
- ***Project planning and technology selection***: develop more quality software based on endemic characteristics of Chinese buildings
- ***Economic assessment***: assesses EPC's project financial return and evaluates investments based on life-cycle cost analysis
- ***Project commissioning resources:*** develop more resource options for project commissioning that cover more sectors
- ***M&V***: expands to cover a wider range of potential post-construction situations and contracting models
- ***Training resources***: expand training, especially for the industrial sector.

POLICY SOLUTIONS AND MARKET MECHANISMS

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IN COLLABORATION WITH

ESCO COMMITTEE OF CHINA ENERGY CONSERVATION ASSOCIATION (EMCA)

About the Policy Paper

- Developed by the LBNL-PNNL team in collaboration with EMCA
- The policy paper builds on the findings from the white paper and offers detailed insights on creating solutions and mechanisms to addresses specific barriers to EPC
- Recommendations focus on the government's role. Chinese cities are already investing in incentives for EPCs, and it's important for cities to make these investments as impactful and cost-effective as possible.

Focus areas of policy recommendations

- Stimulating energy savings through incentives for EPCs
- Effective leveraging of government funding
- Scaling up energy performance contracting in China's public sector

Stimulating Energy Savings through Incentives for EPCs

- Allowing for more diverse contracting and financing models to benefit from government incentives
- Encouraging deeper energy savings projects through performance-based incentives and establishing national accreditation and credit rating systems

Model	Target Sector	Primary Barriers Overcome	Select Challenges with Implementation
Short-Termed Guaranteed Savings	Commercial and public buildings	Self-financed by host or by third party financing. Project host withholds portion of ESCO's fee (e.g., 20% of project costs) for an agreed term until after M&V, limited to first year of ESCO's savings guarantee in effect, is complete and savings are verified	Because guarantee is shorter-term, measures with longer paybacks will not be adopted.
Energy Service Agreement	Public buildings, commercial buildings	Government-owned or authorized special purpose vehicle (SPV) bears loan on its balance sheet – no upfront finance by ESCO or host client, relieving ESCO from financing and host credit risk and relieving host from upfront capital cost which may limit host's ability to obtain future financing for core business needs	Government-owned SPV could increase government debt; amend government budget rules to let public institutions keep savings to repay retrofits; enforcement of complex agreements and M&V; government must develop in-house or outsource capacity to assess host credit risk and technical risk of efficiency measures
On-Bill Financing	Residential, commercial buildings	No upfront financing by customer or ESCO; Diversified types of financing as long as payment made via utility billing; Bill payment history help assess and enhance customers' creditworthiness	Requires regulatory changes; requires utilities to modify billing system. For heating services, on-bill financing may be more feasible for buildings in Southern China where district heating is not provided, as compared with difficult application in Northern China where heating services are not metered
Supply Chain-Driven Finance	SME manufacturers	SME access to third-party financing guaranteed by multinational corporation (MNC) so no (or limited) upfront equity by SME host or ESCO; product cost-savings shared between SMEs and upstream buyer MNC	Resistance from SMEs in sharing cost data; SMEs hosts may not want financing on balance sheet

Scaling up Energy Performance Contracting in China's Public Sector

- Develop training programs that raise awareness and build capacity of major stakeholders to implement EPCs in the public sector.
- Modify government budgeting rules to allow public institutions to keep their energy budgets for the duration of the contract.
- Amend procurement rules to authorize EPCs and introduce facilitating mechanisms, such as long-term contracting and two-stage tendering in the public sector.

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U.S. – China Climate Change Working Group – Energy Performance Contracting (EPC) Initiative Pilot Projects Opportunity

Objectives

- Encourages U.S. and Chinese organizations to get real-world experience in other's market using innovative, feasible business models alongside local practitioners.
- Introduces and applies best practices from one market in other market.
- Promotes participant application of integrated solutions to foster deep energy savings.
- Test new market approaches that have potential for wide replication.

Pilot Projects Approach

- Approach
  - Incorporate all of the criteria into their Memorandum of Understanding (MOUs)
  - Deadline for MOUs is August 3, 2015
  - DOE, State and NDRC will review MOUs for completeness and notify parties whether pilot project will receive recognition
  - Intended to demonstrate replicable, self-sustaining models based on measured energy savings – no funding provided by either government
  - Recognized projects provide basic quarterly email updates

- Value Proposition for Participants
  - Projects exceeding minimum requirements receive high-profile recognition during an MOU signing ceremony at U.S. – China Energy Efficiency Forum (EEF) in September 2015
  - As long as all criteria are met, the project can be tailored to satisfy interests of organizations involved in the project

Pilot Projects Criteria

- Identifies specific facility
  - Name and location
  - Facility type / purpose
  - Size (For buildings, at least 1,500 m^2; for industrial facility/plants, must consume at least 5,000 metric tons of coal equivalent per year)
  - Average annual energy use

- Outlines an integrated approach that will retrofit at least 3 systems and reduce energy consumption relative to baseline conditions (derived from average facility energy consumption over past 3 years) by at least:
  - Industrial facility/plant: 30% on average across affected systems (specify basis for estimated savings)
  - Commercial/public building: 25% of entire building's energy use (specify basis for estimated savings)

- Specifies primary participants (e.g., EMC/ESCO, key vendor, technology provider, financial institution, facility owner, facility operator)

- Includes at least one U.S. or one Chinese ESCO/EMC and one U.S. or one Chinese technology or finance company

Pilot Projects Criteria

- Must use all of the following with strong potential to address traditional barriers in the project's market:
  - Financing – 3rd party or public-private financing, leveraging government or industry association to reduce market risks and introduce diversified financing strategies to fairly allocate risks and costs
  - Contracting – Use innovative contract structures (e.g., energy savings agreements, guaranteed savings contracts, hybrid models) to address barriers, such as split incentive and lack of access to financing
  - M&V – Protocols consistent with the rigor and principles of the International Performance Measurement and Verification Protocol to ensure accuracy and credibility. Need documentation of direct measurement of savings.

Pilot Projects Criteria

- Differentiates project from others pursued in the market
- Agrees to email DOE and NDRC each quarter on progress details, which will be publicly shared
- Specifies a project start date within 9 months of signing of the MOU
- Includes approval and signature of principals from each participating organization indicating that a good-faith effort will be pursued

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Deadline for MOU Submissions is August 3, 2015. Send in English and Chinese to both:

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ECP support for the US-China Energy Performance Contracting (EPC) Initiative

April 29, 2015

US China Energy Cooperation Program (ECP)

- Formally launched in 2009, ECP was created to provide a public-private sector platform to work on issues important to the China's clean energy sector, and U.S. trade interests. Today ECP is comprised of 35 member companies, and five U.S. and China public sector advisors—the US Departments of Energy and Commerce, and the U.S. Trade and Development Agency (USTDA), National Energy Administration (NEA), and Ministry of Commerce China(MOFCOM).

- Since its establishment in 2009, ECP has achieved Presidential recognition for its dedication to advance the development and deployment of clean energy solutions through commercial engagement and joint projects.

- ECP's mission plays an important role helping China achieve its Climate Change goals. The heart of ECP's program is to help Chinese project sponsors identify US clean energy solutions and technologies, and to share pertinent experience.

ECP Working Groups

TEN Working Groups	Chair/Cochairs
Clean Coal (CCWG)	LP Amina, Peabody
Clean Transportation & Fuel (CTFWG)	Celanese, Cummins
Decentralized Energy and Combined Cooling, Heat & Power (DECHPWG)	Caterpillar, Cummins, GE
Energy Financing & Investment (EFIWG)	**Baker Botts, Johnson Controls, Calera**
Energy Efficient Building & Design (EEBDWG)	UTC, Intel
Industrial Energy Efficiency (IEEWG)	Dow Chemical, Johnson Controls
Nuclear Power (NPWG)	Westinghouse
Renewable Energy (REWG)	Bright Source, GE
Smart Grid (SGWG)	Honeywell, IBM, Cisco
Shale Gas (SHGWG)	GE, Baker Botts

ECP/EFIWG support for the EPC Initiative

- **Objective:** Convene an industry-led working group to share EPC best practices, develop new contract models and create guidelines in order to scale deep energy savings retrofits and support EPC initiative pilot projects.
- **Approach**: Work with EMCA to schedule regular in-person meetings and teleconferences (generally in Chinese language) in order to define, develop and execute a comprehensive set of EPC initiative pilot projects. The kick-off meeting is scheduled for May 7th in Beijing.
- **Planned Activities:**
  - Share best practices and lessons learned in implementing guaranteed energy savings EPC projects in the U.S. and China.
  - Define EPC contracting models that can attract third-party financing and meet the criteria for EPC initiative pilot projects.
  - Facilitate project-level partnerships between ESCO contractors, technology providers, financial institutions and facility owners.
  - Recommend policies that could accelerate the adoption of EPC contracting models in particular localities and sectors.

Thank you!

Q&A Session

The EPC deliverables are available at:
http://www.globalchange.umd.edu/research-areas/energy-efficiency-and-mitigation/epc/

Please send feedback on the webinar to KuRC@state.gov