U.S.–China Clean Energy Research Center
中美清洁能源研究中心

U.S.-China Clean Energy Research Center Progress Report

Presented Jointly by

Dr. Robert C. Marlay, U.S. Director
U.S. Department of Energy

Counselor LIU Zhiming, China Director
China Ministry of Science & Technology

Beijing, China

September 23, 2011

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CERC Progress Report -- Outline of Presentation

- Progress Overview
- Governance and Research Leadership
- Joint Work Planning, Projects & Partners
- Cooperation & Collaboration
- Intellectual Property
- Funding
- Joint Web Site
- Summary

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Progress Overview

Protocol Establishes 3 CERCs: Coal, Vehicles, Buildings	Nov 2009
U.S. Awards $7.5M to Three U.S. Consortia	Sep 2010
China Organizes CERC Teams & Leadership	Nov 2010
U.S.- China Sign Joint Work Plans (U.S.-China Summit)	Jan 2011
U.S.- China Teams Carry Out Joint Research Planning	Jan -Sep 2011
China Commits $7.5M to Three Chinese Teams	Apr 2011
Joint Workshop on Intellectual Property (HUST/Wuhan)	May 2011
Joint Signing of 1st Technology Management Plan (Coal)	Aug 2011
Joint Signing of Other 2 Technology Management Plans	Sep 2011
U.S. Awards $7.5M (2nd Year Funding) to Three U.S. Consortia	Sep 2011
More than 100 Research Activities Defined, Mostly Joint	Sep 2011
U.S. & China Sign Endorsement Letters to 3 TMPs	Sep 2011

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CERC Governance

Steering Committee

U.S.
Secretary Steven Chu, DOE

China
Minister WAN Gang, MOST
Administrator LIU Tienan, NEA
Vice Minister QIU Baoxing, MOHURD

Secretariat

U.S.
Assistant Secretary David Sandalow, DOE

China
Vice Minister CAO Jianlin, MOST
Members: Deputy Director General MA Linying, MOST
Director General LI Ye, NEA
Deputy Director General HAN Aixing, MOHRUD

Executive Committee for Clean Coal Consortium

Executive Committee for Buildings Consortium

Executive Committee for Clean Vehicles Consortium

MOST: Ministry of Science & Technology; NEA: National Energy Administration; MOHURD: Ministry of Housing and Urban-Rural Development

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CERC Directors & Secretariat Support

U.S.

- U.S. Director, U.S.-China CERC
  - Dr. Robert C. Marlay, DOE
- Director, East Asian Affairs
  - Dr. Casey Delhotal, DOE

China

- China Director, U.S.-China CERC
  - Counselor LIU Zhiming, MOST
- Director, Americas and Oceania
  - WANG Qiang, MOST

Roles and Responsibilities:

- Provide Inter-Governmental Coordination for CERC between the U.S. and China
- Facilitate Intra-Governmental Coordination for CERC within Respective Countries
- Provide Technical and Analytical Support for Steering Committee and Secretariat
- Provide Leadership for CERC Consortia within Respective Countries
- Coordinate Support and Guidance on Diplomatic and Legal Matters

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Leadership of CERC Research Teams

	Coal		Vehicles		Buildings	
U.S.	WVU	Director Dr Jerald J Fletcher	UM	Director Dr Dennis Assanis	LBNL	Director Dr Mark D. Levine
	LLNL	Tech Pgm. Mgr. Julio Friedmann	UM	Deputy Director Jun NI (Research)	ORNL	Deputy Director Michaela Martin
	WVU	Collaboration Mgr SUN Quingun	UM	Deputy Director Huei PENG (China)	LBNL	China Liaison Nan ZHOU
	WVU	Operations Manager Sam Taylor	UM	Operations Manager Carrie Morton	LBNL	Operations Hongyou LU
China	HUST	Director Dr ZHENG Chugang	Tsinghua	Director Dr OUYANG Minggao	MOHURD	Director Dr LIANG Junqiang
	Huaneng CERI	Chief Engineer Dr XU Shisen	Tsinghua	Deputy Director Dr WANG Hewu	Tsinghua MOHURD	Tech Pgm. Mgr. Dr JIANG Yi
	Tsinghua	Chief Scientist Dr YAO Qiang	Tsinghua	Deputy Director Dr QIU Xinping		

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Executive Committee & Roles and Responsibilities

- Reports to CERC Secretariat
- Composition:
  - Technical Leaders and Experts in Field
  - Up to 5 U.S. Leaders/Experts
  - Up to 5 Chinese Leaders/Experts
- Roles and Responsibilities:
  - Provide Oversight and Review of CERC Progress
  - Advise on CERC Portfolio and Projects
  - Identify Opportunities for Synergies with Other Related R&D Programs
- Work Processes to Be Least-Burdensome As Possible:
  - Meet Virtually, via Telcon and/or Digital Video Conferencing
  - Briefed by Consortium Leaders Virtually (Minimize Travel)
  - May Visit CERC Projects in Conjunction with other Business

* TMP = Technology Management Plan for Allocation of Intellectual Property, under CERC Protocol

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Executive Committee for Clean Coal

- U.S. Committee Members
  - Jim Wood, Deputy Assistant Secretary, Office of Clean Coal, U.S. Department of Energy
  - Dr. Daren Mollot, Director, Office of Clean Energy Systems, DOE
  - Guido DeHoratis, Director, Office of Oil & Gas Resource Conservation ,DOE
  - Dr. Jay Braitsch, Senior Advisor for Strategic Planning, DOE

- Chinese Committee Members
  - XIU Binglin, Director of S&T division, Dept. of Energy Conservation and S&T Equipment, NEA
  - ZHOU Dadi, Vice Chairman, China Energy Association
  - HE Jiankun, Deputy Director, State Climate Change Expert Committee
  - JIANG Hongde, CAE academician, Tsinghua University
  - HUANG Qili, CAE academician, Engineer-in-chief, Northeast China Grid Co.

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Executive Committee for Clean Vehicles

- U.S. Committee Members
  - Patrick Davis, Manager, Vehicles Technology Program, DOE
  - Steve Goguen, Supervisor, Fuels, Combustion, & Deployment, DOE
  - Larry Johnson, Director, Transportation Technology R&D Center, Argonne Nat. Lab
  - Dave Howell, Team Leader for Hybrid and Electric Systems, DOE
  - Gurpreet Singh, Team Leader for Advanced Combustion Engine Technologies, DOE

- Chinese Committee Members
  - CHEN Jiachang, DDG, Dept. of High and New tech, MOST
  - REN Xiaochang, Director, China Automotive Engineering Research Institute (CAERI)
  - WU Zhixin, Deputy Director of China Automotive Technology &Research Center (CATARC)
  - WANG Binggang, China Society of Automotive Engineering
  - WANG Jiqiang, Deputy Chief Engineer , Tianjin Institute of Power

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Executive Committee for Buildings Efficiency

U.S. Committee Members

- Roland Risser, Deputy Assistant Secretary for Building Technologies, U.S. Department of Energy (DOE)
- Dr. Patrick Hughes, Director, Building Technologies Research and Integration Center, Oakk Ridget National Lab
- Dr. Hunter Fanney, Chief, Supervisory Mechanical Engineer , Building Environment Division , National Institute of Standards and Technology
- Richard Karney, Senior Technical Advisor , Emerging Technologies Team, Building Technologies, DOE

Chinese Committee Members

- TONG Guichan, Deputy Director, Division of Int'l S& T Cooperation, Dept of Building Energy Efficiency and S&T, MOHURD
- LI Baizhan, Professor, Chongqing University
- XU Wei, Director, Institute of Building Environment and Energy Efficiency, China Academy of Building Research
- TAN Hongwei, Professor, Tongji Univ.
- ZHU Neng, Professor, Tianjin Univ.
- HAO Bin, Director, Division of Industry Development, Center of Building Energy Efficiency, MOHURD

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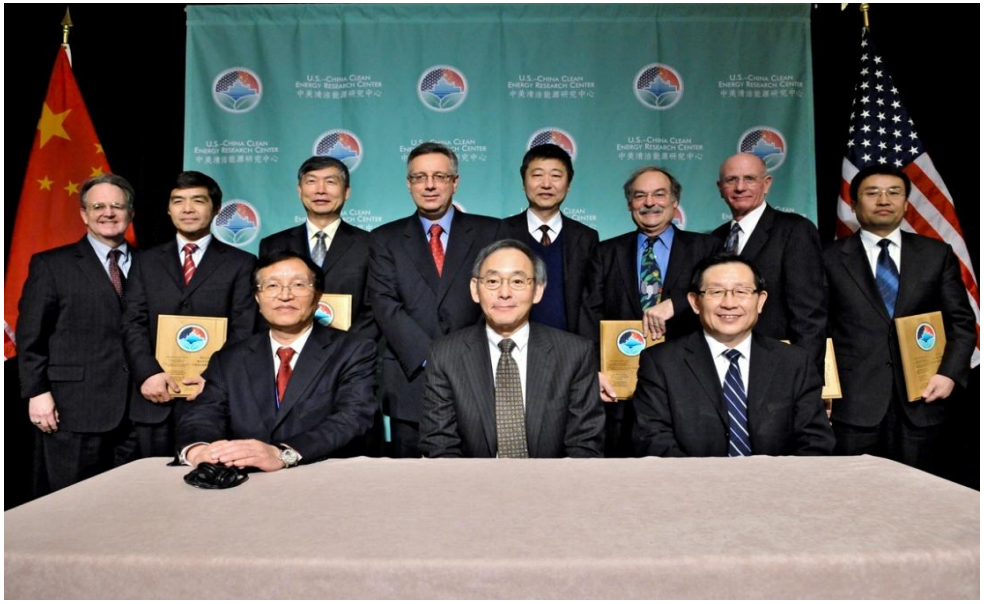
Joint Work Plans
CERC Signing Ceremony



Signing of Joint CERC Work Plans (January 18, 2011)

Front Row (left to right), CERC Steering Committee: Zhang Guobao, Vice Minister, PRC National Reform and Development Committee, and Administrator, National Energy Administration; Steven Chu, Secretary, U.S. Department of Energy; Wan Gang, Minister, PRC Ministry of Science & Technology; Not Shown, Qiu Baoxing

Back Row (left to right): Bob Marlay, U.S. DOE, U.S. Director, U.S.-China CERC; Ouyang Minggao, Tsinghua University, PRC Director, CERC Vehicles; Li Peigen, President, Huazhong University of Science and Technology, Representing PRC, CERC Coal; Dennis Assanis, University of Michigan, U.S. Director, CERC Vehicles; Jiang Yi, Tsinghua University, PRC Director, CERC Buildings; Mark Levine, Lawrence Berkeley National Laboratory, U.S. Director, CERC Buildings; Xu Shisen, Clean Energy Research Institute, Huaneng Energy Group, PRC Technical Program Manager, CERC Coal; Not shown: Liang Junqiang, PRC Ministry of Housing and Urban-Rural Development, PRC Technical Program Manager CERC Buildings

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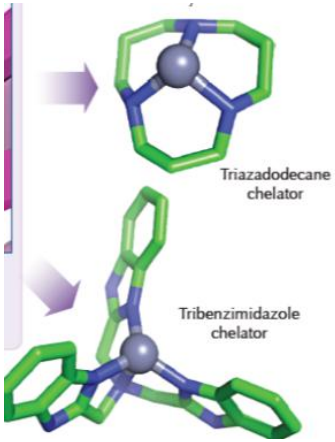
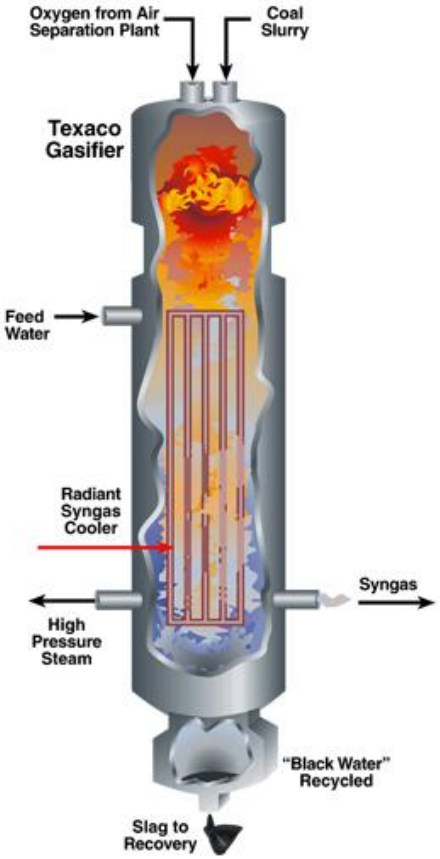
Advanced Coal Technology

Advanced Coal Conversion, Including IGCC with CCS

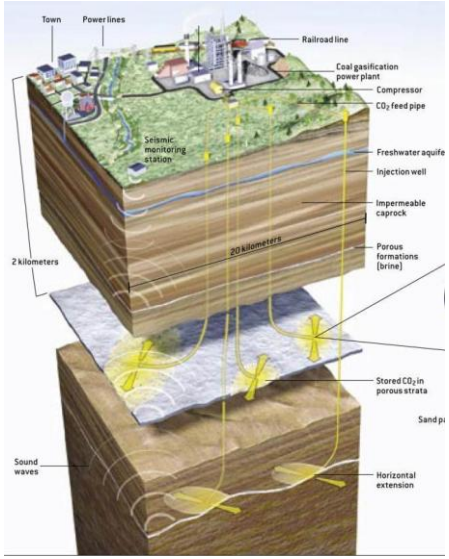
CO2 Utilization, Including Micro-Algae for Fuels



Novel CO2 Capture



Oxy-Fuel Combustion



CCS Technology & Geologic Storage

B&W amine test center, OH

Post-combustion CO2 Capture

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Advanced Coal Technology Partners

U.S.

- **Project Lead**
  - West Virginia University (WVU)
- **Partners:**
  - Alstom
  - Babcock & Wilcox (B&W)
  - Duke Energy (Duke)
  - General Electric (GE)
  - GreatPoint Energy
  - Indiana Geological Survey (IGS)
  - Lawrence Livermore National Lab (LLNL)
  - Los Alamos National Lab (LANL)
  - LP Amina
  - National Energy Technology Lab (NETL)
  - U.S.-China Clean Energy Forum (CEF)
  - University of Wyoming (UWy)
  - University of Kentucky (UKy)
  - World Resources Institute (WRI)
  - Wyoming State Geological Survey (WGS)

China

- **Project Lead**
  - Huazhong Univ. of Science and Technology
- **Partners:**
  - Ctr. for Energy & Power, Ch. Acad. of Sciences;
  - China Huaneng Group Clean Energy Res. Inst.
  - China Univ. of Mining and Technology
  - China Power Engineering Consulting Group Corporation (CPECC)
  - ENN (XinAo Group)
  - Huaneng Power Int'l., Inc
  - Inst. for Rock & Soil Mechanics, Chinese Academy of Sci.
  - NW Univ. of China
  - Shanghai JiaoTong University
  - Shenhua Group
  - Tsinghua University
  - Yanchang Petroleum
  - Zhejiang University, Hangzhou

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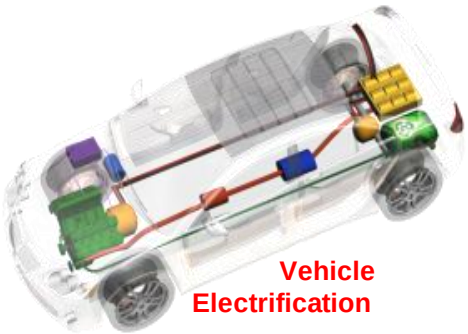
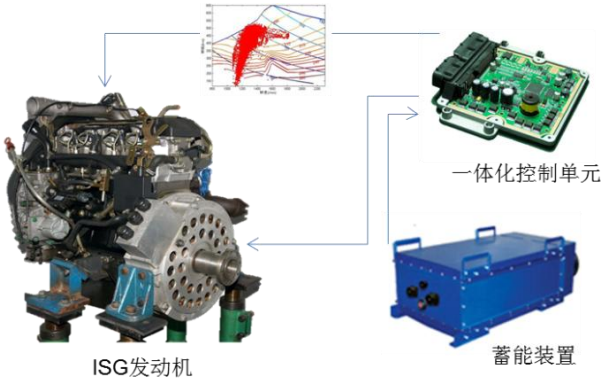
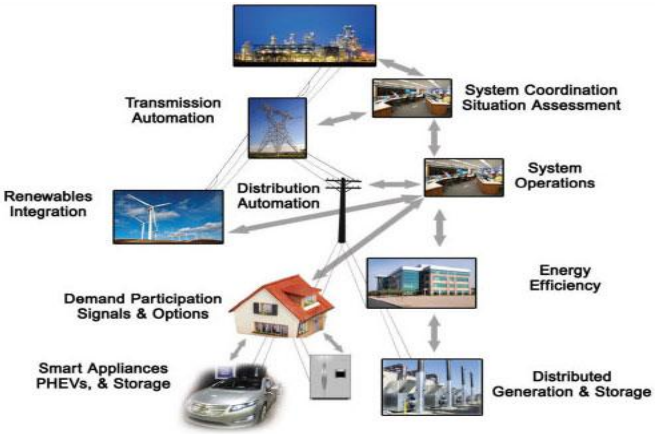
Clean Vehicles



Vehicle Electrification

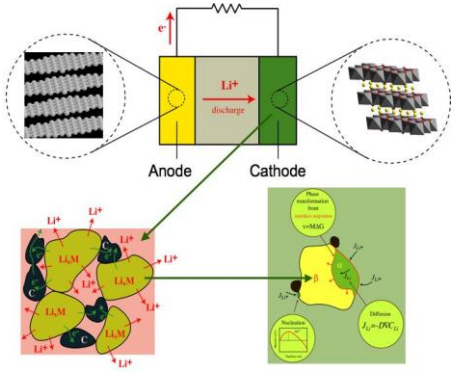


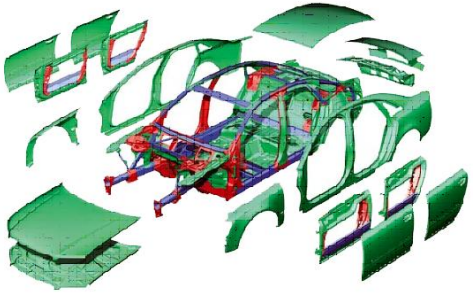
Biofuels & Clean Combustion



Vehicle Grid Integration

Adv. Batteries & Energy Conversion





Lightweight Materials &Structures

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Clean Vehicles Partners

U.S.

- **Project Lead:**
  - University of Michigan (UM)
- **Partners:**
  - A123 Systems
  - American Electric Power (AEP)
  - Argonne National Laboratory
  - BorgWarner
  - Chrysler, Engine
  - Cummins
  - Delphi
  - FirstEnergy
  - Ford Motor Company (Ford)
  - Fraunhofer USA
  - General Motors (GM)
  - Huntsman
  - Magnet
  - Massachusetts Institute of Technology (MIT)
  - Oak Ridge National Laboratories (ORNL
  - Ohio State University (OSU)
  - Sandia National laboratories, Livermore (SNL)
  - Toyota Motor Company (Toyota)
  - Transportation Research Center (TRC)

China

- **Project Lead**
  - Tsinghua University
- **Partners:**
  - Beijing Institute of Technology
  - CHANA
  - China Potevio
  - Chinese Academy of Sciences
  - Geely Automobile
  - SAIC
  - Shanghai Jiao Tong University
  - Tianjin University
  - Tongji University
  - Wuhan University of Technology
  - Wanxiang

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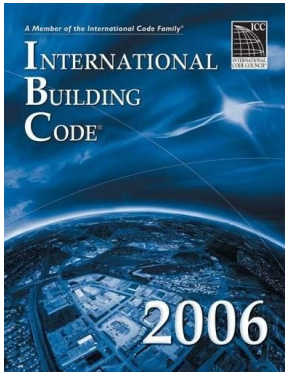
Buildings Energy Efficiency

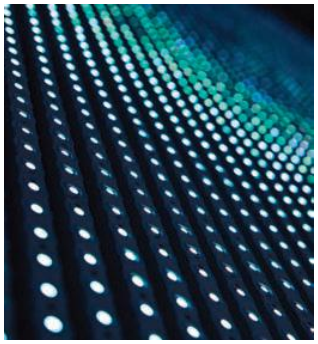
Very Low Energy Buildings, Including RE Integration

High Efficiency Building Envelops, Including Cool Roofs



Commercialization & Market Related Research

Building Energy Use Monitoring & Simulation



Building Equipment, Including Solid State Lighting

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Buildings Energy Efficiency Partners

U.S.

- **Project Lead:**
  - Lawrence Berkeley National Laboratory (LBNL)
- **Partners:**
  - Bentley
  - CertainTeed Corporation Saint-Gobain (CertainTeed)
  - ClimateMaster
  - Energy Foundation China Sustainable Energy Program
  - GE Global Research (GE)
  - Honeywell International Incorporated (Honeywell)
  - ICF International (ICF)
  - Massachusetts Institute of Technology (MIT)
  - National Association of State Energy Officials (NASEO)
  - Natural Resources Defense Council (NRDC)
  - Oak Ridge National Laboratory (ORNL)
  - Pegasus Capital Advisors (PCA)
  - Schneider Electric
  - The DOW Chemical Company (DOW)
  - UC Davis (UCD)

China

- **Project Lead**
  - Ministry of Housing and Urban-Rural Development (MOHURD)
- **Partners:**
  - Beijing Industry University
  - Center of Science and Technology of Construction of MOHURD
  - China Academy of Building Research (CABR)
  - China Building Standard Design Institute
  - Chinese Green Building Council
  - Chongqing University
  - Guangdong Provincial Academy of Building Research
  - Leye Energy Service, Beijing
  - MOHURD Center for Building Energy Efficiency
  - Shenyang Architecture University
  - Shenzhen Institute of Building Research
  - Southeast University
  - Tianjin University
  - Tongji University
  - Tsinghua University

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New Model for Enhanced Collaboration

Cooperation (Traditional)

- Work Plans Coordinated, but Separate
- Independent Work on Similar Projects
- Interactions Characterized by Research Visits, Personnel and Student Exchanges
- R&D Focuses on Institutional Strengths
- Relationships Collegial
- R&D Results Shared Externally
- Benefits Mainly Academic. Transfer of Knowledge via Technical Papers & Reports
- No guaranteed IP Rights in Other's Territory. IP Provisions Not Flexible

Collaboration (New)

- Work Plans Developed Jointly
- Work Together on Same Projects
- Research Characterized by Division of Labor Among Participants on Joint Tasks
- R&D Exploits Complementarities
- Relationships Interdependent
- R&D Results Can Arise Jointly
- Benefits are Embedded among Partners and Extended by Interests in Commercialization
- Guarantees a Right to IP in Other's Territory. IP Terms & Conditions May be Negotiated

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Summary of Research Activities

CERC Technical Track	Joint Work Plan Research Areas	Number of Research Activities	Present Extent of Joint Work	Goal for Joint Work
Advanced Coal Technology Consortium	7	44	93%	100%
Clean Vehicles Consortium	7	24	70%	100%
Building Energy Efficiency	7	35	50%	100%
Summary	21	103	~73%	100%

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Innovation on Intellectual Property

- CERC Protocol Recognizes that:
  - Protection of IP is One of the Most Important Steps to Promote Innovation
- Participants in Both Countries Now Have an Agreement on an IP Framework, namely:
  - "Technology Management Plan" (TMP) Regarding the Exploitation of IP Rights
  - Clear in Both Languages
- The TMP Provides Strong Protection for:
  - Existing (or Background) IP Used in the CERC
  - New IP that is Created as Part of the CERC
  - Allows for Sub-Agreements Specific to Each Research Project & Its Participants
- Owners of Background IP Control the Use of that IP
- CERC Protocol Differs from Prior S&T Agreements between U.S and China:
  - The IP Annex Requires that "a right" be Conferred by the Inventing Party to the Non-inventing Party.
  - The TMP further Defines this "Right"
- Where IP is Created in a Jointly-Funded Research Project, the Project's Participants in Both Countries Have the Right to Obtain a License to the IP
- Disputes, if Any, May Be Resolved in Neutral Settings Under International Law

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Five-Year Funding Plan

Planned CERC Awards (Over 5 Years)

Technology Area	U.S.		China		Total Project Funding	On Track
	DOE	Partners	MOST	Partners		
Clean Coal	$12.5M	≥ $12.5M	$12.5M	$12.5M	$50.0M	✔
Clean Vehicles	$12.5M	≥ $12.5M	$12.5M	$12.5M	$50.0M	✔
Buildings	$12.5M	≥ $12.5M	$12.5M	$12.5M	$50.0M	✔
				Planned	**$150.0M**	✔

Note: $ = U.S. Dollars
M = Millions

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CERC Websites

- Joint Portal to Two Websites
- U.S. CERC Website (Public Access)
  - DOE maintains an external website in English
  - http://www.us-china-cerc.org
- China CERC Website (Public Access)
  - China maintains an external website in Chinese
  - http://www.cerc.org.cn/

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Summary

- Much Progress in First Year
- More Work to Do, Including:
  - Completing Project and Partner Sub-Agreements
  - Declarations of Background IP, Where Desired
  - Carry out Joint Research
  - License and Exploit New IP
  - Commercialize Outcomes
- Potential Benefits to Realize
  - Large Markets for Clean Energy Technology
  - Higher Efficiency, Lower Costs, Lower Pollution, Lower Emissions
- Innovative Model for Bi-Lateral S&T Cooperation

CERC LOGO

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