



**U.S.-CHINA CLEAN  
ENERGY RESEARCH CENTER**  
中美清洁能源联合研究中心

# **U.S. – China CERC 8<sup>th</sup> Steering Committee Meeting**

## **Overview by U.S. & China CERC Directors**

**Dr. Robert C. MARLAY**  
**U.S. Director**  
**International Affairs**  
**U.S. Department of Energy**

**Mr. CAI Jianing**  
**Associate Counsel**  
**Department of International Cooperation**  
**Ministry of Science & Technology, China**

**Beijing, China**  
**July 1, 2016**



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# CERC Headlines U.S. – China Clean Energy Initiatives



In November 2009, President Obama and former President Hu Jintao announced CERC and six other Joint Clean Energy Initiatives. The CERC Protocol was signed on Nov 9, 2009.



In November 2014, Presidents Obama and Xi Jinping jointly announced significant National commitments to reduce GHG emissions. CERC was heralded as an exemplar of cooperation between the two countries; and again in 2015.



## Phase I (2010 – 2015; Renewed to 2020)

1. Advanced Coal Technology with CO<sub>2</sub> Capture, Utilization and Storage
2. Building Energy Efficiency
3. Clean Vehicles



## Phase II (New Tracks, 2016 – 2020)

4. Energy & Water Technologies
5. Medium and Heavy-Duty Trucks
6. Intellectual Property Education, Training, and Technical Support



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# “New Model” for Enhanced S&T Collaboration

<b>Cooperation (Traditional)</b>	<b>Collaboration (CERC)*</b>
<ul style="list-style-type: none"> <li>Work Plans Coordinated, but Separate</li> </ul>	<ul style="list-style-type: none"> <li>Work Plans Developed Jointly</li> </ul>
<ul style="list-style-type: none"> <li>Independent Work on Similar Projects</li> </ul>	<ul style="list-style-type: none"> <li>Work Together on Same Projects</li> </ul>
<ul style="list-style-type: none"> <li>Interactions Characterized by Research Visits, Personnel and Student Exchanges</li> </ul>	<ul style="list-style-type: none"> <li>Research Characterized by Division of Labor Among Participants on Joint Tasks</li> </ul>
<ul style="list-style-type: none"> <li>R&amp;D Focuses on Institutional Strengths</li> </ul>	<ul style="list-style-type: none"> <li>Joint R&amp;D Exploits Complementarities</li> </ul>
<ul style="list-style-type: none"> <li>Relationships Collegial</li> </ul>	<ul style="list-style-type: none"> <li>Relationships Interdependent</li> </ul>
<ul style="list-style-type: none"> <li>R&amp;D Results Shared Externally</li> </ul>	<ul style="list-style-type: none"> <li>R&amp;D Results Can Arise Jointly</li> </ul>
<ul style="list-style-type: none"> <li>Benefits are Mainly Academic; Transfer of Knowledge via Technical Papers &amp; Reports</li> </ul>	<ul style="list-style-type: none"> <li>Benefits are Embedded among Partners and Extended by Interests in Commercialization</li> </ul>
<ul style="list-style-type: none"> <li>No guaranteed IP Rights in Other's Territory; IP Provisions Not Flexible</li> </ul>	<ul style="list-style-type: none"> <li>Guaranteed Right to IP in Other's Territory; IP Terms &amp; Conditions May be Negotiated</li> </ul>
<ul style="list-style-type: none"> <li>Few IP Advantages for R&amp;D Partners</li> </ul>	<ul style="list-style-type: none"> <li>Potentially More Attractive IP Platform</li> </ul>

\* Jointly Funded Research Projects, as Defined by Mutually Agreed-Upon Technology Management Plans



# Selected Indicators of CERC Outcomes, Phase 1

Overarching Goal	Performance Measure	Value
<b>1. Research</b> – Accelerate the Pace of Innovation in Clean Energy Technology via R&D	• Number of outcomes of technical significance	44
	• Number of researchers supported by CERC	1,124
<b>2. IP</b> – Protect IP, Encourage Its Use, and Improve US-China Interactions Regarding IP	• Number of invention disclosures	13
	• Number of patent applications	26
	• Number of major IP education and training products developed	11
<b>3. Markets</b> – Facilitate Market Access among Participating Businesses in order to Speed Technology Deployment	• Number of products launched	15
	• Number of standards, codes, and market-related policies informed by CERC and promoting clean energy and efficiency.	10
<b>4. Engagement</b> – Strengthen Bilateral Relationships and Engagement between the U.S. and China	• Important diplomatic outcomes attributed, in part, to cooperative activities of CERC	7
	• Joint workshops, technical meetings and training sessions	248



# Phase I Retrospective – Lessons Learned \*

## Contributions to Success

- Strong Leadership in Both Countries
- Prestigious Endeavor Attracts Top Scientific & Technical Talent
- “New Model “for Joint Collaboration Builds Respect and Trust
- Innovative IP Framework Mitigates Risk and Enables More Ambitious Research
- Five Years Allows Time to Build Meaningful Research Relationships
- Industry Engagement & Cost-Share Shepherds Useful Outcomes
- S&T Strategies & Complementarities Found to be Powerful and Productive

## Challenges

- Expectations for Outcomes Are High
- Resources Do Not Match Expectations & Are Spread Among Too Many Projects
- Transaction Costs Can Be High, Requiring Patience and Perseverance
- Industry Participation is Essential, but in Some Cases Difficult to Acquire & Retain
- Need for More Projects Truly Joint and Collaborative in Both Countries
- Some CERC Projects had Little Impact
- Need to Narrow Scope and Focus on Top Priorities with Potential for High Impact

\* Based on in-depth interviews of 25 leading participants in CERC 1.0.



### CERC Funding Awards (2016 - 2020)

Technology Area	U.S.		China	Total Project Funding
	DOE	Partners	MOST & Partners	
<b>CERC-ACTC*</b>	\$12.5M	≥ \$12.5M	\$25M	\$50M
<b>CERC-CVC*</b>	\$12.5M	≥ \$12.5M	\$25M	\$50M
<b>CERC-BEE*</b>	\$12.5M	≥ \$12.5M	\$25M	\$50M
<b>CERC-WET*</b>	\$12.5M	≥ \$12.5M	\$25M	\$50M
<b>CERC-MHT</b>	\$12.5M	≥ \$12.5M	\$25M	\$50M
*Funding has been awarded for 5-year period, 2016-2020			<b>Planned</b>	<b>≥\$250M</b>

Note: \$ = U.S. Dollars  
M = Million

Key: ACTC – Advanced Coal Technology Consortium  
CVC – Clean Vehicles Consortium  
BEE – Building Energy Efficiency Consortium  
WET – Energy & Water Technologies Consortium  
MHT – Medium and Heavy Trucks Consortium



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# Bilateral Leadership of CERC 2.0 Research Teams

	Coal		Vehicles		Buildings		Energy and Water		Trucks	
United States	WVU	Director James WOOD	ANL	Director Dr. Don HILLEBRAND	LBNL	Director Dr. Nan ZHOU	UC	Director Dr. Ashok GADGIL	TBD	TBD
	WVU	Collaboration Manager Dr Qingyun SUN	ANL	Deputy Director Dr. Michael WANG	LBNL	Deputy Director Dr. Rick DIAMOND	UC	Deputy Director Dr. Scott SAMUELSEN	TBD	TBD
	WVU	Ops Manager Sam TAYLOR	ANL	Deputy Director Dr. Kal AMINE	LBNL	China Program Manager, Dr. Yuan YAO	UC	Deputy Director Dr. Soroosh SOROOSHIAN	TBD	TBD
			ANL	Ops Manager Dr. Yan ZHOU	LBNL	Ops Manager Carolyn SZUM	UC	Ops Manager Carolyn REMICK	TBD	TBD
China	HUST	Director Dr. ZHENG Chuguang	THU	Director Dr. OUYANG Minggao	MOHURD	Director Prof LIANG Junqiang	RIPED	Director LIU He	TJU	TBD
	Huaneng	Chief Engineer Dr. XU Shisen	THU	Deputy Director Dr. WANG Hewu	THU	Tech Director Dr. JIANG Yi	CNPC	CNPC Representative ZHU Ronggai	TBD	TBD
	THU	Chief Scientist Dr. YAO Qiang	THU	Deputy Director Dr. QIU Xinping	CABR	Deputy Director Prof JIANG Lihong	IWHR	Deputy Director WANG Jianhua	TBD	TBD
			THU	Ops Manager Dr. DU Jiuyu	MOHURD	Program Manager Dr. PENG Chen	IWHR	Secretary-General BAO Shujun	TBD	

WVU: West Virginia University; ANL: Argonne National Lab; LBNL: Lawrence Berkeley National Lab; UC: University of California; THU: Tsinghua University; MOHURD: Ministry of Housing and Urban-Rural Development; CABR: China Academy of Building Research; TJU: Tianjin University



# Summary of Research Activities

Technology Consortium	Joint Work Plan Research Areas	Research Activities	Joint Research Activities	Present Extent of Joint Work	Goal for Joint Work
Advanced Coal Technology <sup>a</sup>	5	17	14	80%	100%
Clean Vehicles	4	20	19	95%	100%
Building Energy Efficiency	5	5	5	100%	100%
Water & Energy Technologies	5	28	20	71%	100%
Medium and Heavy Trucks	5	TBD	TBD	TBD	100%
<b>TOTAL</b>	<b>24</b>	<b>70</b>	<b>58</b>	<b>83%</b>	<b>100%</b>

<sup>a</sup> Planned for Phase 2, pending approval of China ACTC draft work plans.





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## Researchers Supported by CERC

Technology Consortium	U.S.	China	Total
Advanced Coal Technology	60	200	260
Clean Vehicles	40	100	140
Building Energy Efficiency	33	33	66
Water & Energy Technologies	26*	80	106
Medium and Heavy Trucks	TBD	TBD	TBD
<b>TOTAL</b>	<b>159</b>	<b>413</b>	<b>572</b>

\* Preliminary estimates, based on faculty only; to be supplemented by 10 to 20 graduate students when research starts



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## CERC Partners

Technology Consortium	U.S.		China		Total Participants
	Lead	Partners	Lead	Partners	
Advanced Coal Technology	WVU	18	HUST	19*	37
Clean Vehicles	ANL	20	THU	34	54
Building Energy Efficiency	LBNL	29	MOHURD	49	78
Water & Energy Technologies	UC	15	RIPED	21	36
Medium and Heavy Trucks	TBD	TBD	TJU	TBD	TBD
<b>TOTAL</b>	<b>5</b>	<b>82</b>	<b>5</b>	<b>123</b>	<b>205</b>

\* Planned for Phase 2, pending approval of China ACTC draft work plans.



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# Past Guidance from Steering Committee

## CERC Steering Committee Guidance -- 2015

- Publicize Accomplishments (from Phase I and in the Future)
- Develop more Focused Goals and Roadmaps for Phase II, with More Impact
- Attract More Universities, Research Institutes, and Industrial Partners
- Seek Improved IP Cooperation to Better Utilize New Knowledge
- Apply Successes and Learnings from Phase I to Phase II
- For ACTC, Emphasize Efficiency Opportunities and Using CO<sub>2</sub> as a Resource
- For CVC, Examine Whether Early Outcomes can be Applied to Manufacturers
- For BEE, Increase Emphasis on Demonstration Projects

## CERC Steering Committee Guidance -- 2014

- Be Ambitious, Creative and Bold
- Broaden Participation Among Research Performers
- Strengthen Engagement with Industrial Partners; Recruit New Partners
- Concentrate on Selective Areas with High Payoff
- Enhance Research Quality and Impact Selected Projects
- Leverage Platforms and Resources of Others
- Show Roadmaps that Will Achieve Public Benefits by 2020



DOE Secretary MONIZ,  
MOST Minister WAN  
1 June 2015



Ambassador Baucus, Secretary Moniz,  
MOST Minister Wan & Vice Minister Cao,  
and Chief Planner Tang Kai, MOHURD.  
11 July 2014



- Highlights of Research Outcomes, CERC 1.0
- Strategy and Goals, CERC 2.0
  - Focusing on how apply research outcomes to demonstration and industrilization, and fomulate standards jointly
  - Active role industry can play including joint investment in the third countries
- Joint Work Plans and Anticipated Projects
- Actions and Key Milestones



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## CERC Web-Links



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**中美清洁能源联合研究中心**

U.S.: <http://www.us-china-cerc.org>

China: <http://www.cerc.org.cn/>